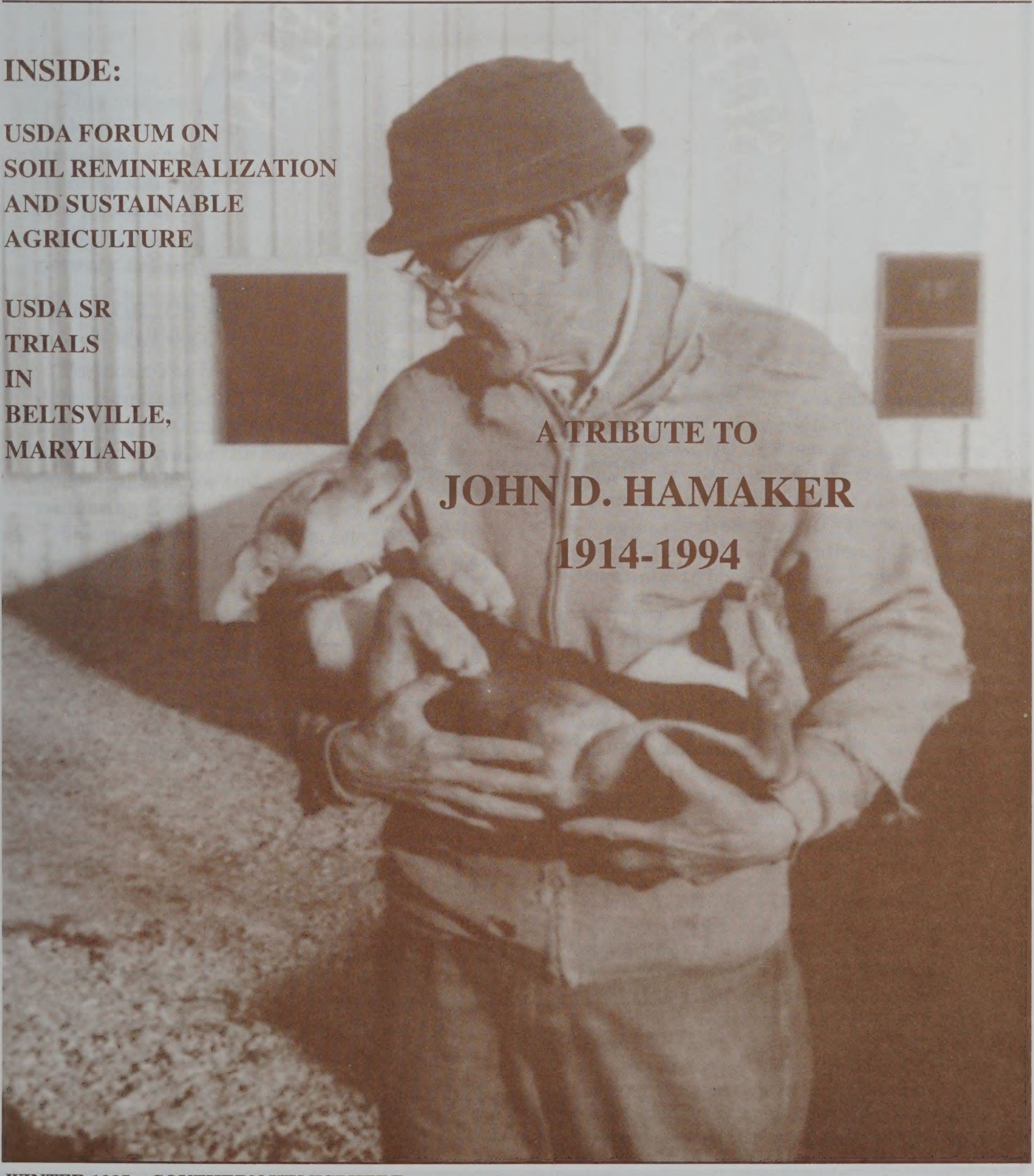
REMINERALIZE THE EARTH

Regenerating our soils, forests and health

RECYCLING MINERALS with finely ground gravel and rock dust

DOUBLE ISSUE NUMBER 7-8

SUMMER 1995 • NORTHERN HEMISPHERE



INSIDE:

USDA FORUM ON SOIL REMINERALIZATION AND SUSTAINABLE AGRICULTURE

USDA SR TRIALS IN BELTSVILLE, MARYLAND

A TRIBUTE TO
JOHN D. HAMAKER
1914-1994

WINTER 1995 • SOUTHERN HEMISPHERE

REMINERALIZATION BEGINS WITH *YOU*

Heal Yourself
Heal The Planet

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REMINERALIZE THE EARTH

Regenerating our soils, forests and health

Recycling minerals with finely ground gravel and rock dust

This magazine is a reflection, forum, round table of ideas, experiences and research of those concerned with networking and implementing soil remineralization. Articles, letters, and photos are welcome and appreciated. We reach an emerging grass roots community network around the world.

EDEN OR ICE AGE
Which Will We Choose?

The book *The Survival of Civilization* by John Hamaker and Don Weaver is regarded by a growing movement worldwide as a blueprint for the survival of the Earth, restoring ecological balance and, perhaps, even recreating Eden.

The remineralization of forests, farms, orchards and gardens with glacial gravel and rock dust is nature's way to regenerate and fertilize soils. During an Ice Age, as glaciers grind rock to a fine dust over millennia, a fertile soil is created. Adding finely ground gravel dust to soils is a tremendous boost to organic agriculture and can make it truly viable by adding up to a hundred elements and trace minerals needed by all life and by nourishing the microorganisms in the soil, whose protoplasm is the basis of all living things.

There is evidence to suggest that as forests begin to die off worldwide, giving off carbon dioxide, the climate of the Earth is altered, triggering the transition from the warm interglacial to an Ice Age. We are hastening this process with the burning of fossil fuels. Undertaking the task of remineralization is urgent to restore our agricultural soils and to save the dying forests in the temperate latitudes and stabilize our climate.

On the Cover:

This issue is dedicated to Anita and the late John D. Hamaker.

Susan Stockton wrote in the June *Acres U.S.A.*,

This brilliant engineer/ecologist had a profound grasp of the interrelationship between planetary ecology, the health of the individual and the rise and fall of civilizations. He understood the link between agricultural practices, physical and mental health, weather patterns and earth changes.

John inspired many throughout the world to earth regeneration. May we continue to be inspired to loving action by his life and work.

See *Tribute to JDH* in this issue.

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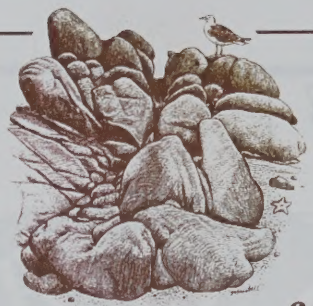

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From *Remineralize the Earth...*

About and In this issue

I would like to thank you, readers, for your tremendous patience in waiting for this long delayed double issue. This has been a momentous year in many ways.

Anita Hamaker told me that John was waiting for two things: to see his 80th birthday which was celebrated in March, 1994 and to hear about the outcome of the forum that took place on May 24 in Beltsville, Maryland at the USDA headquarters. He witnessed both, and passed away about a month after the forum.

This issue is a tribute to John Hamaker and his wife Anita for their lifelong dedication to making the world a better place for all of us. It has been a privilege to assist in getting the message out through ***Remineralize The Earth*** (***RE***) and networking in various ways. It is now up to the rest of us to continue those efforts.

Ground breaking in its significance for official recognition, has been *The Forum on Soil Remineralization (SR) and Sustainable Agriculture* along with the current and continuing USDA trials on SR, being monitored by Dr. Ron Korcak.

The conference was hosted by the USDA and I would like to thank Dr. Ron Korcak and the organizing committee for a splendid forum. I would also like to express my gratitude to all of the speakers and participants who came from all over the U.S., Canada and Australia, all paying their own expenses from air fares to hotels: Greg Watson, the keynote speaker, and Robert Bruck have many times over the years dedicated their efforts and resources to furthering remineralization; William Fyfe, Ward Chesworth and Michael Powell came from Canada and represented agrogeology; and much gratitude to all the other speakers who graced this historic meeting with their presence.

Also of official note, *The Emergency Climate and Stabilization Act* which calls for SR will be put before Congress by Representative Ron Dellums of California, through the efforts of Alden Bryant, Fred Wood and the Earth Regeneration Society in Berkeley, California.

It was a great honor for ***RE*** to be a candidate for the national Renew America Award. The nomination was initiated by Bill Holmberg, President of the American Biofuels Association and I thank him.

A recent gift/grant from The Massachusetts Society to Preserve Agriculture (founded 1792) to ***RE*** to incorporate for non-profit status will allow for the possibility of grants/funding and the acceptance of tax-deductible donations from individuals, businesses, and organizations!

A volunteer will download ***RE*** onto Internet and this will get the magazine out to many more readers.

There needs to be a re-thinking of the most economical and practical way to produce ***RE***. Ideally, I would like to shift formatting and layout to someone else and this would allow more time for writing articles for other publications and promoting SR on a broader scale. The size of the publication has become larger over the years, and the costs to produce and mail it have increased tremendously.

This is a double issue with double the unrepeated pages, and it is necessary to have it be equal to two issues on your subscription, otherwise it would not have been possible to get it out to you. Small circulation publications are expensive to print. Therefore I am asking all those who are not on a fixed income to consider renewing at the $25.00 subscription rate. (within the U.S.)

Joanna Campe interviewing George 'Sun" Hadley in Gaien Garden

I have been so fortunate to have volunteer help from ***RE*** readers in word processing and editing, specifically, Wm Hurrle and Beth Josephson of Green Bay, Wisconsin, Rob Gould of Salem, Oregon and Reinhold Arnold of Irvine, California, along with Janet Scott, who has assisted me for many years, and to Don Weaver, of course, for his advice and assistance in so many ways! Thank you, Renate Hageman for updating the Gravel Source list. I would like to thank them for their significant contribution to this issue.

Special thanks to the following and others who have sent contributions to support ***RE***:

Paul Bourassa
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Richard Ware

Thank you readers, who paid $25.00 for a subscription and help support us in getting issues to NGOs and peace corp volunteers in:

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Republic of South Africa
Sri Lanka

Please consider supporting a specific subscription to a favorite organization, individual, here or abroad.

A Tribute to John D. Hamaker

and how he changed one person's life...

In the early spring of 1984, friend Barry Lynes loaned me a book called *The Survival of Civilization* (TSOC) by John Hamaker and Don Weaver. I had recently completed a two-year study in wholistic healing and nutritional therapies and was beginning to shift my focus to ecological concerns and the healing of the Earth. I had "officially" said to the universe before taking a trip to Europe, *give me a task.*

When I read it on my return, I sensed that this was the task laid out before me. The thesis of John captured my imagination and the potential to regenerate Earth on a vast scale from the microorganisms in the soil to great forests, to stabilizing climate.

> *Your newsletter is great. It will provide a sense of cohesiveness to draw TSOC people in a community together and make them more effective where they live.*
>
> *John Hamaker (1985)*

I found myself, like many who feel passionate about an issue, wanting to learn more about all aspects of it, a lone individual who wishes to do something and begins from that point, really not sure how to begin, but ready to make an effort. It was an exercise in empowerment. And I found I was not alone. I began by writing letters. At first it seemed no one answered and at some point I could hardly keep up with my mail!

Networks of those with the same concern were taking shape. Bertram Cohen of Poughkeepsie, NY wrote and suggested a newsletter. I thought of all the TSOC activists I knew and realized, the only person with time and means to do it was probably myself, elected by default. And so *Soil Remineralization, A Network Newsletter* began in 1986. Neither writer, nor speaker, nor editor, neither scientist nor expert, here I was, attempting and learning whatever was necessary.

> *You seem determined to do the impossible – so go ahead and do it.*
>
> *JDH (1984)*

And the network grew, spread out all over the world from the very beginning. I was also fortunate in that a lot of the research had been done in Germany and as my husband Christian is German we occasionally made trips there, collecting research from all over the world to support and build credibility for SR in the U.S.

I corresponded with others who greatly inspired my efforts such as Don Weaver and Betsan Coats. My admiration for them also put wind in my sails. Betsan has networked all over the world advocating reforestation, walking in the footsteps of Richard St. Barbe Baker and was one of the early ones to recognize the importance of John's work.

John and I corresponded and spoke on the phone regularly, and I was so happy to have him write for the newsletter and to answer questions of readers. I never had the privilege of meeting him, but felt him as a close guiding presence, lively and spirited, warm and humorous as he urged humanity to get on with the task before us, if we are to survive. John was concerned about the future of Earth and his children and children's children, ever aware of the task and frustrated by the lack of response to the crisis, as he saw it from government and those who were in a position to initiate change.

He was a genius and an independent thinker, the realization of whose vision could contribute to the health of the Earth and all life. John had an extraordinary, uncompromising character, and tenacity to continue to urge others on to the task ahead. He gave up his successful career as an engineer to publish his book and write articles to reach others with his message, meanwhile living as a subsistence farmer. Anita, who had been a teacher, dedicated her life to caring for John and assisting him with his life's work.

I don't really like to speak of John in the past tense. I think his presence is still with us and urges us on to fulfill our potential in restoring and regenerating Earth. Whether you are dedicated to a healthier garden, more productive and fertile farm, want to save the dying forests or involve yourself in the larger vision of climate, if you are pragmatic or idealistic or both, I'd like to ask you to acknowledge John Hamaker, who has changed the course of more than one person's life, and who points the way toward life at its most fruitful and truly sustainable for all Earth.

Joanna Campe

Remembering John

letters from friends and admirers

He fought a long and courageous battle for life and health and common sense. His insightful analysis, experimental investigations and dogged determination nurtured an idea that has engaged the consciousness and enlisted the efforts of people around the planet. He will be sorely missed.

V. and F. G.

He made a very deep impression on the organic movement by his strong emphasis on the value of minerals, and will always be remembered for that. Every time I see references to rock dust, I always think of him....

The new big conferences on remineralizing soil are a tribute to his efforts.

B.C.

He did indeed keep this person steady on the path of truth, for which I will always remember and honor him. He has helped, perhaps more than anyone else, to lay the ground work for the real and spiritual civilization of tomorrow.

H.L.

There are many of us who move differently through life because of John.

Y.M.R.

John and Anita Hamaker at home in Potterville Michigan, 1984

What I always remember first...is the way his twinkling gaze and encasing smile always called me forth to be fully alive in the moment.

J.M.

John will live on in the hearts and minds of the many people he touched.

H.Q.

It must have been frustrating for him at times to be "blessed" with more vision than most people!

M.F.

It must have been wonderful for John to see the fruition of his work, really developing at the big rock dust meeting in May.

B.C.

Finally, John, I'd like to say thanks; for giving me and the kids a future, for having the courage to be the only one in step for so long, for rejecting the glitter and finding the gold, and for having the courage to shout your truth above the lies and hypocrisy of the looking-glass world.

H.A.

John Hamaker

One Who Will Be Missed

by Charles Walters

Probably the greatest supporter of John's work in the earlier years, the seventies, and until now has been Charles Walters, publisher and editor of Acres USA, a fiercely independent newspaper that is a pioneer publication for writers and thinkers of ecological and economically sustainable farming. Through that paper and its many readers, John gained a wider audience.

John Hamaker, a long-time contributor to *Acres, U.S.A.*, and a modern voice for mineralization of farm acres, passed from the scene June 30. He had hoped to live to age 80, *(and he did, J.C.)* but his goal was cut short by exposure to chemicals of organic synthesis, an assault from which he never fully recovered.

John Hamaker, in the *Acres, U.S.A.* index of materials, took up almost a full column of eight-point type, starting in 1973 and going up to the present. A student of geology, history, and a half-dozen other disciplines, Hamaker discerned that when the glaciers marched across the landscape, glacial gravel remained to provide the proper mix of essential nutrients. Unfortunately, killer agriculture had been imposed on the nation's acres to acommodate the needs of the fossil fuel people for a dumping ground.

He looked down the road, outlining in understandable terms the shape of the future if technology did not mend its ways.

Hard nitrogen and salt fertilizers, Hamaker saw, in turn had locked up and complexed the soils, and otherwise deprived them of the nutritional mix required by soil's life.

In 1969 Hamaker took his concepts to Dr. Lynn S. Robertson, a Michigan State University soil scientist. He told the schoolman about his early results with powdered gravel dust, and even took him out to see several plots where gravel dust had worked its specialty.

Hamaker also ran his findings up the flagpole with Dr. Sylvan W. Wittwer, the agronomist who first proved foliar nutrition with atomic tracer studies. Hamaker got the brush-off both times.

John Hamaker turned to *Acres, U.S.A.*, and in time his in-depth reports told readers about mineralization. He looked down the road, outlining in understandable terms the shape of the future if technology did not mend its ways.

The world cannot live well at the level of its great men. John Hamaker was one of them.

In time he enlisted Don Weaver in co-authoring *The Survival of Civilization*, a text that gained international attention and ultimately backgrounded a video presentation and publication, *Remineralize the Earth*. Finally, Hamaker's two-decade-long fight for the saving action of remineralization reached Beltsville, where a conference styled *Soil Remineralization and Sustainable Agriculture* was held shortly before Hamaker's death.

Given the Hamaker push, the concept has achieved a following not seen since Julius Hensel wrote *Bread from Stones*. Harvey Lisle's upcoming book, *The Enlivened Rock Powders*, credits Hamaker with "seer" status, and Don Weaver has already proposed a biography of John Hamaker.

The world cannot live well at the level of its great men. John Hamaker was one of them.

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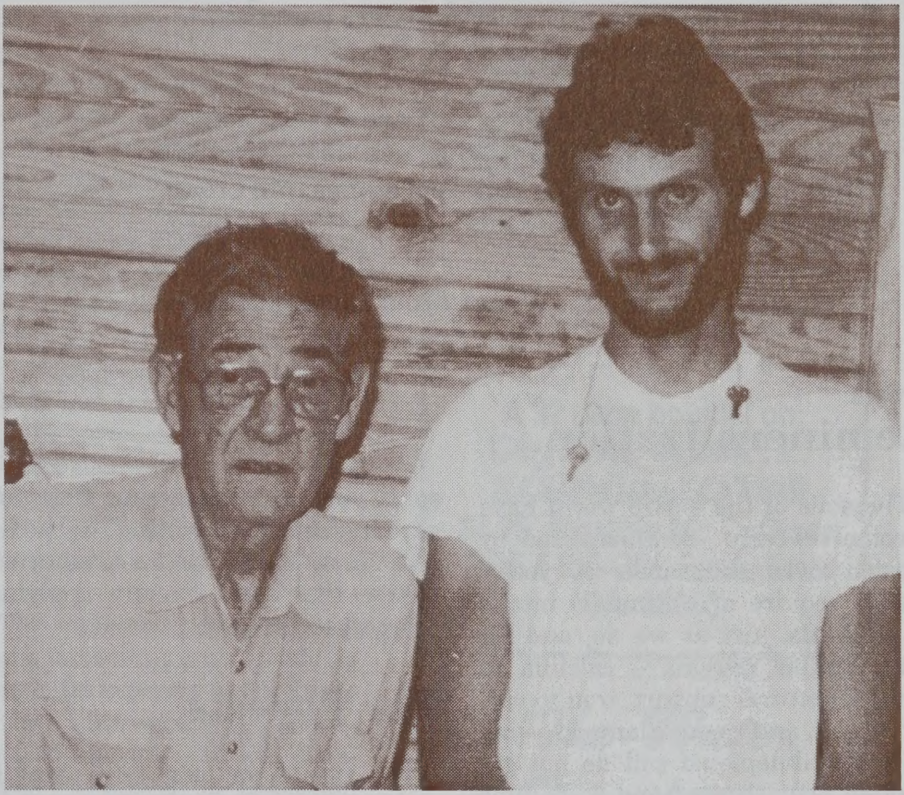
With thanks

to John Donald Hamaker



John and Don Weaver in Seymour, Missouri in 1987.

Thanks, John, for:

Giving the last 30 or more years of your life to the restoration of our personal, societal, economic, and planetary Health.

Doing what you saw to be right, honest, and true to the natural laws of Life, regardless of its "popularity".

Speaking out for the Earth and humanity, and questioning, questioning, going beyond "easy answers" and "the conventional wisdom" into the deeper causes, the long-term effects – looking toward the "seventh generation" and beyond...

Respecting and responding to every person who came to you with questions, ideas, problems. You gave yourself unstintingly to any sincere person or important problem. That is why you were so valuable to your engineering companies, and so invaluable to the world after your work became solving "the problems that afflict humanity" and the Earth.

Being my true friend, great mentor, partner in trying "the impossible" (are the Marines helping yet?), and an inspiration as unfailing as your own devotion to "the Cause". You showed me the deeper respect and love of Nature's beauty and wisdom, offering complete health and abundance to all when given the chance. Your generous spirit could see the Generous Spirit in Nature.

Your deep seriousness and your ability to sense humor and express your own special healing laughter.

Embracing the responsibilities Life gave you with your amazing intelligence and insights. As well as a real "Friend of the Earth" you were, from all reports, a great husband and father. When I heard that your last words were "I love you", as you squeezed Anita's hand, I realized it was not something you said often, but it was the verbal expression of what your life was about. I don't think anyone who was privileged to know you well had any doubt.

Thanks, John.

Don Weaver

A BRIEF PERSPECTIVE

Soil Remineralization

As Ward Chesworth and co-researchers write in *Agricultural Alchemy: Stones into Bread:*

> "Our most optimistic expectations are no less than the realization of an old dream: What will fertilizing with stone dust accomplish? It will turn stones into bread... make barren regions (fruitful) (and) feed the hungry."
>
> Julius Hensel
> *Bread From Stones* (1894)

Soil Remineralization

The soils of the entire world have become severely demineralized by erosion over thousands of years. Plants require a continuous intake of minerals, just as we do, and for very similar reasons – calcium to build structural support, iron to carry oxygen, and so on. Plants growing on mineral-depleted soil do not get enough nourishment and so become smaller, less-abundant and less hardy, more vulnerable to the insects, worms and fungi that prey upon them.

Remineralization causes a phenomenal growth of the micro-organisms in the soil. It increases the nutrient intake of plants. It counters the effects of soil acidity, prevents soil erosion (just for that reason it would be worth applying rock dust), increases the storage capacity of the soil, contributes to the building of precious humus complexes, has anti-fungal properties, and when you spray it on plants it repels insects as well. The plants and trees become highly resistant to insects, disease, frosts, and drought. Remineralization also enhances and speeds up the process of composting, so if you are composting for your garden, consider putting on some rock dust. It can be even more effective than just directly applying compost to the land.

The above information is condensed from the writings of John Hamaker, Don Weaver, Larry Ephron and Joanna Campe.

For Forests

The results of long term experiments released in 1986 showed that *in a forest where pine seedlings were remineralized, after 24 years the wood volume was four times higher* than in the untreated area.

Recent remineralization trials of a dying forest on Mt. Mitchell by Dr. Robert Bruck, Ph.D., *showed 12 weeks after application of rock dust, height growth of red spruce was increased by 27% over non-treated controls, and height growth of Fraser fir was 19% greater* than the untreated controls. (*Forestry Research* packet p. 9)

The Men of the Trees organization in Australia is doing remineralization trials with many species of trees in Australia with phenomenal results, *such as five times the growth of tree seedlings of one variety of eucalyptus, over the untreated controls.* (See *Forestry Research* packet p.17)

For Agriculture

The best source of soil minerals is simple crushed gravel dust. In 1976 John Hamaker spread gravel crusher screenings on part of his ten acres in Michigan. The following year, in an area of sparse rainfall and dry summers, *and with no irrigation,* his corn produced 65 bushels per acre, compared to yields of under 25 from other local farms.

Moreover, when independent analyses were done, Hamaker's corn was found to contain 28% more protein, 47% more calcium, 57% more phosphorous, 60% more magnesium and 90% more potassium than the same type of corn grown with chemical fertilizers nearby.

Twenty years ago the USDA published studies which showed that cement kiln dust (a less-satisfactory source of minerals) also produced better crops, but they couldn't understand "what element" in the dust was responsible and dropped the matter.

Don Weaver grew 18-foot pole beans on remineralized soil (Jack and the Beanstalk?) and got *two to four times the normal organically grown yield.* Alan LePage of Vermont grew a crop of carrots averaging 1-1/2 feet long. And there was no insect damage to any of these crops.

Hamaker estimates that on fully remineralized soil, American agriculture could grow *four times* as much food as it is capable of now – or the same amount of food at about one-fourth the cost – and with no pesticides or chemical fertilizers.

The Nutritional Aspect

When we eat food grown on depleted soil we too, like the plants, lose our natural resistance to disease. All the degenerative diseases have been on the rise in America in recent decades. Dietary fat, cholesterol, salt and overly-refined foods seem to be major factors, but a serious deficiency of minerals in our food may be another. Mineral depletion of soils has been found to be directly correlated with death rates. And deficiencies of only one of a number of trace minerals – copper, iron, selenium, etc. – have been found in laboratory studies to be associated with an increased risk of cancer. You may want to grow more complete, nourishing food for yourself and your family.

A Global Perspective On Climate

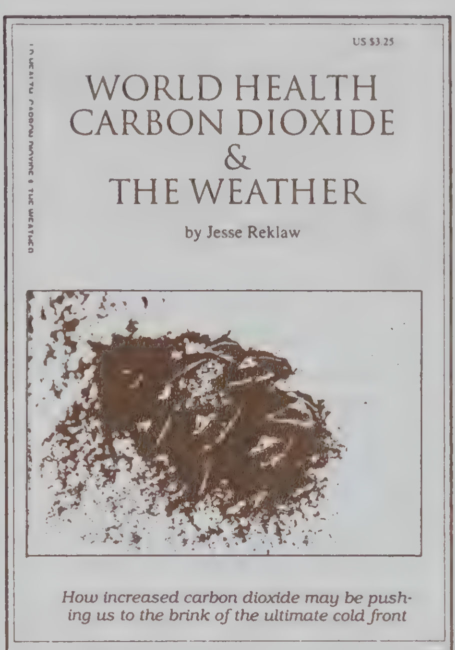
The problem of soil demineralization also has a global perspective. It is known that the Earth's soil becomes demineralized during each interglacial period, the relatively short 10,000-year warm period between each 90,000-year major Ice Age. Consequent decline and death of the world's forests and other vegetation which occurs causes great quantities of carbon dioxide to be given off. The level of carbon dioxide in the Earth's atmosphere has been rising exponentially for the past century. Carbon dioxide and other greenhouse gases trap excess heat from the sun, potentially affecting the world's climate.

It is also well-known that when the glaciers advance and then recede during each recurrent Ice Age, they grind down rocks in their path, and this mineral-rich dust is blown far and wide over the surface of the Earth, remineralizing soils and causing plant life to thrive again.

John Hamaker has supplied one missing piece of a cosmic puzzle to provide an explanation, long sought, of the awesome 100,000-year cycle of major Ice Ages. Hamaker points out that the greenhouse effect occurs primarily in the tropics, which get the most sun, rather than in the polar regions which get very little. When this happens, the temperature differential between the tropics and the poles increases, resulting in fierce wind systems, hurricanes, tornadoes and storms.

The moisture picked up by these increasing storm systems also is transported to the higher latitudes, where it gets deposited as snow and ice, eventually bringing on glaciation and the next Ice Age. This has been happening in recent years, with record snow cover in the Northern Hemisphere and a shortening of the growing season, by weeks in some places, a pattern which is also accelerating year by year. Hamaker estimates that within a few decades the growing season may have decreased so much that millions of people will starve, in the richer nations as well as the poorer.

Remineralization of the world's soils and forests will store carbon and contribute to climate stability. By assuming the task of remineralizing the Earth's soils, much as the glaciers do during an Ice Age, we can create fertile soils and abundance. We can re-create Eden.



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A Rock Dust Primer

◆ **Quotes and Gems**
by John Hamaker
from the book
The Survival of Civilization

What Type of Rock Is Best?

Feeding poor soil with mixed rock dust may be compared to feeding an ill person a varied diet of unrefined, natural food. If no one single food is a panacea, it might follow that no single rock type is "ideal." Indeed, the virtue of glacial gravel is said to lie in its broad spectrum of rock types. Hamaker advocates the use of glacial gravel dust, ideally followed by river and seashore gravels and mixtures of single rock types.

John Hamaker in the book *The Survival of Civilization* suggests finely-ground glacial gravel because that is nature's way throughout millennia to create fertile soils. Glacial gravel, which is a natural mixture of rocks, will create a broad spectrum of minerals in the soil in a natural balance.

Much of value can be gleaned from Europe and the research and experiences there (where single rock types and combinations of single rock types are used.) Hamaker's approach, however, may very well offer an even greater potential for an ecologically sustainable and sound agriculture and forestry.

Does It Need To Be a Special Kind of Gravel?

Again, the analogy of feeding soils to feeding humans is pertinent. From simplistic notions of human dietary requirements as straight protein-fat-carbohydrate ratios, our understanding of specific human dietary needs has grown to staggering sophistication and complexity, and we are now learning that what we don't know may exceed what we do. Similarly, we have come a long way from the simple NPK idea. But no amount of controlled research has conclusively told us (or likely will ever tell us) precisely which minerals specific plants really need and in what precise proportion. The attempt to second-guess nature in all her complexity is sure to be a futile and perpetual game of catchup.

Hamaker asserts that: *"Microorganisms select what they need to make the compounds of life, and reject to the subsoil what is not needed, [such as] aluminum, silicon, iron, etc., which are generally in excess [in gravel dust],"* further pointing to "*the Kervran research on biological transmutations*", which suggests that biological organisms may play an active role not only in selecting specific elements, but also in modulating their elemental nature to create needed materials where they are in short supply. Hamaker says:

> *As long as the soil is neutral [in pH] or close to it, microorganisms will control what goes into the plant roots. These controls are off when the soil is acid or acidic chemicals are added.*

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Composting With Rock Dust

Combining gravel dust with organic materials in compost is a great way to solve application problems and speed up the process. Don't forget a handful of soil to inoculate with organisms. Gravel dust improves aeration and structure and therefore prevents rotting. Gravel dust is assimilated even more quickly in compost than in poor soils.

Compost and gravel dust are a symbiotic combination: the compost provides an excellent medium for the "microorganism population explosion" promoted by the dust, and the gravel dust will not only help create more organic matter, but will also help hold it in place, reduce odors and conserve it.

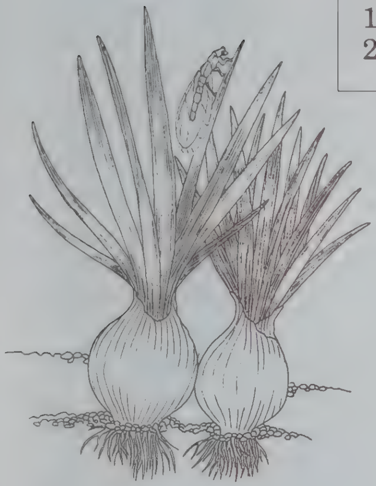
Add 2-20 lb. of rock dust per cubic yard of compost, if one is doing pile or window composting.

Soil Acidity

Soil pH should be measured annually. If the soil is acidic, agricultural limestone may be added together with the rock dust to bring the soil pH to neutral. Gravel dust will also neutralize soils to a great degree, but limestone is a quick remedy for agricultural soils. Limestone is not recommended for forests as it will destroy the humus-building complex over the long term.

Approximate Application Rate Conversions

3 tons per acre = 14 lb. per 100 sq. ft. = 1.25 lb. per sq. yd.
10 tons per acre = 46 lb. per 100 sq. ft. = 4 lb. per sq. yd.
20 tons per acre = 92 lb. per sq. ft. = 8 lb. per sq. yd.



Particle Size Conversion

Particle	Diameter (microns)	Mesh
Fine sand	250 – 100	50 – 125
Very fine sand	100 – 50	125 – 250
Silt	50 – 2	250 – 6000
Clay	2 or less	6000 or more

Keep Insects In Natural Balance In Your Garden

For short-term rescue, very fine dust sprayed directly on plants and trees has been shown in research in Germany to deter insect infestations very effectively. Trails of rock dust around the garden help keep slugs out. And healthy remineralized plants will not be plagued by insect infestations in the long term.

How To Apply Gravel Dust

There are many ways to apply dust to the soil; which method you use depends on the scale and your preference. It can be spread by hand out of a wheelbarrow, or rototilled and disked in. Farmer John Sundquist applies it with a manure spreader, bander or an "E-Z Flow" type fertilizer applicator. He also uses rock dust in a potting soil made of compost, ashes and peat moss.

How Much To Use

◆ *A grower of crops or a gardener needs a good response the first year after a fall application. The response in any one year depends on the amount of minerals available to the microorganisms, soil moisture and the amount of inert organic matter.*

◆ *If the last two factors are satisfactory, as little as 3 tons of gravel dust per acre worked into the top 4 inches of soil should give good results. However, I prefer about 10 tons per acre worked in about 8 inches, since one application will eliminate the cost of a number of more frequent applications and give high yields.*

The Application Conversion chart above will help you to determine how much gravel dust to use: 3 tons per acre is considered the minimum application, 10 tons per acre is Hamaker's preferred long-term application, and 20 tons per acre is given as a major remedial application, for especially dry, poor soil. Smaller amounts are recommended if the rock dust is finer than 200 mesh.

Finding Local Gravel Dust

To find Gravel grinding operations in your area, call your local gravel pit (look in the *Yellow Pages* under Cement-Wholesale, or Sand and Gravel) and ask if they have crushed gravel screenings made from mixed rocks, the kind that comes out of river beds – crushed and passed through a 1/4 inch or finer screen. The gravel dust will probably cost from $1-$8.00 per ton plus the cost of transportation if the gravel pit delivers it to your garden. As most of the cost is in transporting the rock dust, having a truck or access to one is an advantage. A cooperative initiative with friends and neighbors would also cut costs down.

The Particle Conversion Chart shows various categories of "soil separates" (ground particles) listed with their diameters in microns (thousandths of a mm.) and their corresponding screen mesh sizes. "Mesh" simply refers to a screen with a given number of holes per inch.

The more finely ground the rock, the more readily microorganisms will have access to the minerals. John Hamaker uses the term "gravel dust" to mean a dust "90% of which will pass through a 200-mesh screen."

Testing Your Gravel Dust

◆ *Several people have reported to me that gravel dust does not work or it will have [only] a temporary effect. They don't describe the dust in detail, but I suspect they had very little dust in what they call 'dust' Know what you are buying or you may be badly disappointed.*

Here are three simple, quick tests you can perform at home:

Pot Test: A pot test will give you immediate, practical proof of what the product will do in the soil. It is a good idea to add the gravel dust to clay pots and plant radishes or other fast growing plants and observe their progress. As John Hamaker writes:

◆ *Doing a pot test is the most convincing argument I know of. Anybody can do it. There are testing laboratory grinders everywhere. There is no lag time. In 6 hours you can get a microorganism population explosion. Taking some 6" clay pots, I filled them with a 50-50 mixture of earth and peat and 3 heaped tablespoons of dust. The results were astonishing!*

You can compare different mixtures or samples of gravel dust depending on what's available in your area. Use a control without rock dust to compare as well. You can also begin with small plots in the garden. You can see the results of the gravel dust you've chosen and then add it in larger quantities to your garden. Work the gravel dust into the topsoil, if possible.

Separate Layer Test: Purchasing a product based on its stated screen mesh alone still leaves room for error. A purchase of 90% or even 100% 200-mesh screenings could contain only sand and silt, and no true dust. A separate layer test will tell you approximately how much of your "dust" is really dust and will be suspended in water.

Fill a clear glass half full with your sample and cover it with about two inches of water. Shake it up vigorously, then allow it to settle overnight. The dust, silt and sand will settle into three distinct layers with the dust at the top.

If the container is allowed to stand until the water has dried out, the dust [topmost] layer will shrink to about 1/3 the original measurement and give a more accurate percentage of the dust. Your first observation, however, will tell you if you are buying mostly sand. The coarser the grind, the less effective it will be in the soil, and the more you will need to use per acre.

Moisture Test:

◆ *If the material is bought by the yard, there is a probable increase in bulk when wet...The buyer needs to test so one can know the actual weight of dust one is applying to the land.*

Take a sample, weigh it, then dry it thoroughly in the oven [and reweigh it]. This will tell you how much of the weight you are buying is moisture.

Chemical Analysis

In most situations, having a formal chemical analysis made is probably going to unnecessary trouble. A pot test and small-scale trials with fast-growing plants will give you more accurate information and with less expense. In cases where you have doubt about its source, you may wish to have a gravel dust analyzed to ensure that it is free of radioactive elements and toxic industrial by-products. In most cases your source will have already had to undergo such testing in order to get a license to operate. This is worth some homework. If you are not able to obtain documentation to your satisfaction, it might be wise to go ahead and obtain your own independent lab tests. Good testing labs are listed in the *Gravel Sources* section.

More Tips From Hamaker

◆ *One other thing might be useful. I put about 2 inches of sand on our garden before plowing. It will last a long time and give some yield after the dust is used up. I am sure it has been contributing to what we grow. Unscreened sand (preferably fine sand) from a local gravel pit is much more economical than shipping dust which is mostly silt and fine sand.*

◆ *Sometimes the gravel pits have mesh screens and can measure the exact fineness of the gravel. Though it may be hard to find the ideal fineness – 90% passing through a 200-mesh screen – it may be practical to use even if only 20% or so passes through a 200-mesh screen and at least 50% passes through a 100-mesh screen. You will have the finer material immediately available to the soil and the rest will break down over time. If most of it passes through a 200-mesh screen, it will have a fine consistency like flour or cement. The gravel pit may have machinery to crush the rock finer and may crush it for you.*

Soil erosion is an effect of the shortage of minerals available to support the soil organisms. As Hamaker says,

◆ *That shortage can be made up on any piece of land in the time it takes to work ground gravel dust into the topsoil. When that is done, the soil microorganisms begin to multiply and it is they who prevent soil erosion by granulating the soil and holding it against both wind and rain.*

For a more thorough understanding of remineralization, read Hamaker and Weaver's *The Survival of Civilization* and order the Research Packets found in the *Resources* section of this magazine.

We would like to know what results you get from remineralized soil, so that we can improve our knowledge and data-base. Please call or write us. Photos with written reports are welcome and an important contribution to our network.

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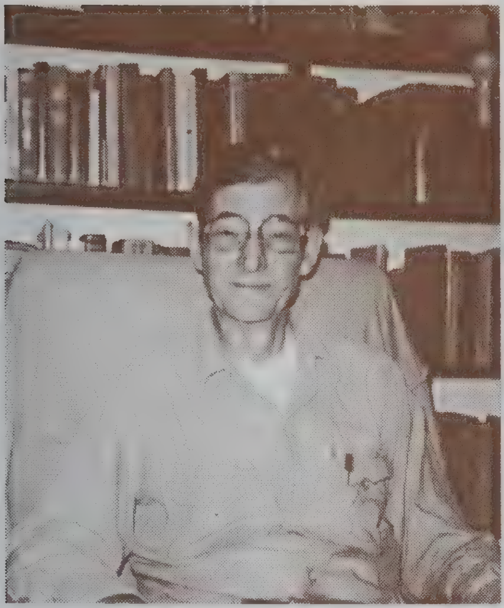
John Hamaker: A Photo Tribute

This study is about some of the basic laws of nature to which we must conform. Those who see the human race as masters of nature invite death on a massive scale. Those who see nature as a code of laws superior to any man-made law can look forward to a quality of life which is almost unbelievable from the perspective of an economy of scarcity subsisting in a wasted land.



Microorganisms produce the protoplasm of all living things. Microorganisms themselves feed on the total mixture of minerals and gases in the biosphere and are energized by carbon. We can build enormous per acre tonnages of protoplasm into the soil in a very short time – enough so that sun energy reaching the plant becomes the limit of growth. The foods of microorganisms are the cheapest raw materials on earth.

Man can stay on the Earth only if the glacial periods come every 100,000 years to replenish the mineral supply – or man gets bright enough to grind the rock himself. There are several other places in the world similar to Hunza, such as the Caucasus Mountains in Russia where 10% of the people are centenarians. There are glaciers in the mountains. Regardless of where it is that people attain excellent health and maximum life, it can be traced to a continual supply of fresh-ground mixed rocks flowing to the soil where their crops are grown.

– J.D.H. quotes from *Acres, U.S.A.* and *The Survival of Civilization*

USDA Begins Field Demonstration for SR

by Dr. Bill Becker

The USDA has begun a series of demonstration trials with rock fines from Georgia, Maryland, and New York, and other industrial by-products. Dr. Ronald Korcak, research leader of the fruit laboratory, is directing the trials. The test plots are small and nonreplicated, but depending upon the initial observations, the study could be expanded to one or more replicated tests. Demonstration trials are usually the beginning step when the researcher has many unknowns or only anecdotal information. Sometimes these demonstrations create more questions than answers, and the researcher must then decide which avenue to follow. If a good difference exists, let's say 20% or greater, then the researcher can justify an expanded study to see if the yield increase or some other parameter is significant and can be repeated with a reasonable amount of certainty. When reading the compiled results from a demonstration with a wide range of products, as is the case with the USDA study, there is a temptation or curiosity to compare all the results to a control or untreated area. Unless there is overwhelming similiarity between the treated areas and the control areas, the comparison is usually un-

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Dr. Bill Becker is an agricultural consultant and plant pathologist in Springfield, Illinois, specializing in sustainable agriculture. He is also the Research Director of the Central Illinois Agricultural Research Farms, Inc. which he founded in 1987 to research and teach the benefits and profitability of sustainable agriculture practices in commercial agriculture. He has a Ph.D. in Plant Pathology from the University of Illinois, 1976; in Botany and a B.S. in Zoology from Western Illinois University, 1971 and 1969.

Agricultural Research Service
Beltsville Agricultural Research Cente

The entrance to USDA headquarters in Beltsville, Maryland

Aerial view of the 8 plots that are part of the trials.

Dr. Ron Korcak and Bob Able take a look at trial corn.

1994 Corn Yield Results In Bushels Per Acre

	Without YWC	With YWC	Difference
Bottom ash	186	141	45
Cement residue	133	159	26
Georgia rock fines (granite)	118	149	31
Maryland rock fines (basalt)	102	103	1
New York rock fines (glacial til)	124	202	78
YWC alone	---	176	
YWC with fertilizer	---	200	24
Fertilizer alone	174	---	

fair and the wrong conclusions may be drawn. Having said all that, let's look at the results of 1994 from the USDA study with the industrial by-products and their effect on corn yields.

Yard waste compost was spread at a rate of 28 dry tons per acre over half of all the plots. At 1.2% nitrogen, this amounted to 672 pounds of nitrogen per acre of which approximately half became available. The entire area of the plot received one of the following applications in tons per acre on a dry weight basis: bottom ash from a PEPCO furnace in Maryland, 9.1 tons; cement residue from cement truck washing in Washington, D.C., 6.4 tons; rock fines from Augusta, Georgia, 10 tons; rock fines from Medford, Maryland, 10 tons; and rock fines from Collins, New York, 8.8 tons. This created five demonstration plots of industrial by-products with and without yard waste compost (YWC). A "control" plot had yard waste compost with and without fertilizer (amount unreported at this time). Another "control" plot had fertilizer only.

A three year rotation is planned with winter wheat to follow the 1994 corn crop. Following the wheat, there will be soybeans, then barley, and then back to corn. Corn ear leaf samples were taken in July and post harvest soil samples were pulled in November. The results of the leaf samples were inconclusive, but some trends were noted with the various treatments. The results of the soil tests have not been released.

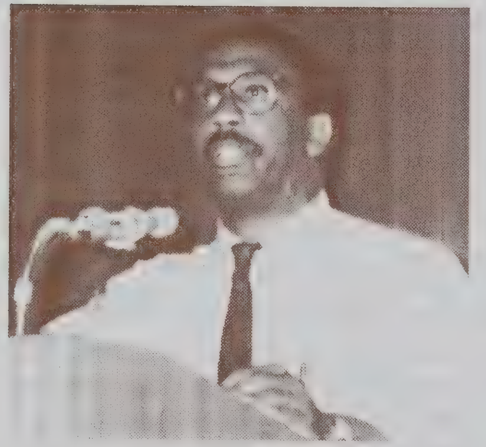
So far, this study is most interesting and hopefully will give birth to many other studies. Rock dust enthusiasts should be pleased to see this kind of work beginning. Good luck to Ron Korcak and the USDA. The results from the wheat will be greatly anticipated as well as any other information related to these demonstration trials.

Trial plot of corn planted with glacial outwash fines from upstate New York (Gernatt Gravel Products, Inc., Bob Able, Sales Manager)

From the editor's page
of the *American Environmental Laboratory* journal

Soil Remineralization
An Essential Environmental Action

by Frederick I. Scott, Jr.



Greg Watson, Keynote Speaker

> ***The forum could represent a milestone marking officially sanctioned efforts to implement long overdue action of fundamental importance to human survival, the ultimate reason for environmental concern.***

To request a copy of the speakers' abstracts for the conference write to: Dr. Ron Korcak, ARS-USDA, Fruit Lab, Bldg. 010A Rm. 245, Barc W, Beltsville, MD 20705

On May 24, 1994, the U.S. Department of Agriculture (USDA) (Beltsville, MD), the U.S. Bureau of Mines (USBM) (Washington, DC), the National Stone Association (NSA) (Washington, DC), and the National Aggregates Association (NAA) (Silver Spring, MD) cosponsored a forum on "Soil Remineralization and Sustainable Agriculture" at the USDA Agricultural Research Station in Beltsville, MD. That forum could represent a milestone marking officially sanctioned efforts to implement long overdue action of fundamental importance to human survival, the ultimate reason for environmental concern. It deserves intensive and continuing attention to assure constructive application of the principles addressed.

As outlined by Ronald Korcak (USDA) of the Organizing Committee, the Forum brought together the by–product rock fines generating industry and the proponents of soil remineralization (SR) to explore environmentally sound uses of rock fines and to identify the state of the science supporting their use and the gaps in knowledge that need to be filled. That the accomplishment of such objectives could impact significantly on survival was addressed in substantial measure by other presenters and warrants further attention here.

Keynote speaker, Greg Watson of The Nature Conservancy (Boston, MA), connected the objectives of the proponents of sustainable agriculture, who seek to discover tools and strategies that will allow farmers to reduce the amounts of chemical inputs used to fertilize and protect crops from pests; with the thesis that the naturally occurring gradual depletion of trace minerals from the soil is the major cause of global forest decline and the deteriorating nutritional content of the world's agricultural crops. The primary goals of sustainable agriculture are to encourage farmers to adopt growing practices that 1) preserve the environment and protect biodiversity and 2) are economically viable. From the efforts to build soil fertility through the discovery and use of organic alternatives to chemical fertilizers, the science underlying the organic aspects of soil development has greatly expanded. The publication of John Hamaker's book, *The Survival of Civilization,* alerted the community to the continuing depletion of inorganic trace minerals that are critically important to the soils, the plants supported by them, and consequently all other life forms that are dependent on plant life. Hamaker (with co-author Don Weaver) demonstrated the outstanding benefits of certain kinds of rock dust in

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Frederick I. Scott, Jr. is editor of American Clinical Laboratory and consulting editor for other publications of ISC, Inc.

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achieving vigorous and healthy growth of plants of all kinds. Watson described larger global context of soil remineralization and discussed the role this concept can play in achieving the goals of sustainable agriculture.

Joanna Campe of the Organizing Committee, editor/publisher of *Remineralize the Earth* (Northampton, MA), reviewed the history of soil remineralization efforts extending from the work of Julius Hensel in the 1880s and his book, *Bread from Stones* (Republished 1991 by Acres, U.S.A.), to the extensive research in agrogeology in Canada (and other places), to the ecological movement concerned with the Hamaker thesis. Highlights from that research include, in Europe for example, a four–fold increase of timber volume after 24 years for pine seedlings remineralized with basalt compared to controls; although no differences between the two were observable for the first six years. The difference was maintained for 60 years from that one remineralization. Similar results were reported in Australia, with five times the growth for some species and potting out time, reduced from five months to six weeks, and, in Michigan, a two and a half times increase in yield of corn without irrigation.

A Material Balance Illustrates the Need for SR

Walter Keller, Professor of Geology, University of Missouri Columbia (Columbia, MO) published papers in the 1940s urging the use of native rocks and minerals as fertilizers, citing research on the benefits obtained. Using a straightforward material balance, he noted that even the unbalanced mineral nutrients supplied by commercial fertilizers fail even to replenish completely the minerals removed by the harvested crop (to say nothing of the essential trace elements not provided in the mix). Application of the record potash production of 1944, for example, would not have replaced the potassium (K_2O) removed from the soil that year by the corn, wheat, and alfalfa harvested that year. For natural weathering of limestone to have replaced the potash, such weathering would have to occur at the rate of one foot in 218 years whereas the estimated natural weathering rate for the U.S. is one foot in 23,984 years.

Visiting the USDA trial plots on SR: Don Supkow, David Jahn and Herster Barres (background), Bob Able listening to USDA's Ron Korcak

That plant growth in general and farming in particular deplete soil of nutrients was attested by Ward Chesworth, University of Guelph, Department of Land Resource Science (Guelph, Ontario, Canada). Early examples of well–developed agricultural systems (Iraq, Pakistan, Egypt, and China) were based on geological delivery systems that provided water and fertile soil for thousands of years. Even so, some of the systems have proven to be unsustainable due to salinization (Iraq and Pakistan) or human intervention (the Aswan Dam built in Egypt in 1964 traps the nutrients that annually renewed the land's fertility). Still, the lesson remains unlearned as the indiscriminate use of dams and intensive irrigation continue.

> ***...the Forum brought together the by–product rock fines generating industry and the proponents of soil remineralization to explore environmentally sound uses of rock fines and to identify the state of the science supporting their use and the gaps in knowledge that need to be filled.***

Soil remediation using energy and urban wastes, reservoir sediments, and mineral waters were reported on by William Fyfe, University of Western Ontario, Department of Geology, and Michael A. Powell, Department of Earth Sciences (London, Ontario, Canada) and Tripathy, Pollution Control Board, Bhubaneswar, Orissa, India. Noting 19th century reports and recent 20 year studies in the U.K. of the benefits of adding ash to existing soils already capable of supporting growth, the authors determined that mixtures of sludge and ash could support tree (pine, ash, and walnut) and grass (indigenous to India) growth. The trees grew at twice the rate of the controls while the grasses yielded hundreds of times the mass of the controls. Field studies in India of trees planted so that the source of the nutrients could be determined showed that some species planted in mixtures of sludge, ash, and weed are growing at 30–100 percent faster than trees planted in soils and fertilizers. Experiments in Por-

Dan Winter, shooting a video of the conference to make available to non-participants

The industry needs to systematically determine the composition, properties, and nutrient availability of each of its aggregate fines and to learn the language of agronomy and the needs of the new customer base. He (James W. Schmitt) urged the industry to cooperatively develop technologies, test methods, and quality standards.

A four-tape set video of the conference is available from ***Remineralize the Earth*** *magazine, $65.00 postpaid.*

tugal confirmed that dam sediments provide excellent remediation for depleted soils. Many deep (1–2 Km) mineral waters, rich in elements such as calcium, magnesium, potassium, etc., have the potential for remineralizing tropical soils (kaolin rich) in regions like the Amazon.

Robert I. Bruck, North Carolina State University (Raleigh, NC) mobilized 200 student volunteers in studying the effects of remineralization on severely declining forest located 5600 feet above sea level in the southern Appalachian mountains. One year after the application of about 1000 lbs/acre of Planters II on 25 acres of the forest, soil and newly flushed tissue samples were analyzed in the spruce/fir zone. (Planters II is a natural sedimentary rock mined at 13,000 feet in the Rocky Mountains, crushed, graded, packaged, and sold as micronutrients by U.S. Soil Co., Salida, CO. It is primarily calcium and magnesium plus 37 trace elements with virtually no nitrogen, phosphorus, or potassium). The most significant preliminary results indicate that tissue levels in both Red Spruce and Fraser Fir of calcium and magnesium have been enhanced from 12–29 percent and soil levels of exchangeable calcium and magnesium have increased an average of 14 percent. Although a significant amount of mortality has taken place, the remineralized plots exhibit 39% fewer dead trees than do the nontreated plots. Observations will be continued during the summer of 1994 as it is too early to establish overall survival and mortality trends for this long–lived system.

David Miller, Oberlin College, Biology Department (Oberlin, OH), evaluated a number of rock dusts including mixed glacial deposits, single mineral types, and some commercial products for their effects on soil nutrient levels, soil microbiology, and nutrient levels of plants grown on treated soils. With the exception of certain cations, changes in available mineral nutrient levels appeared erratic. The results of some standard microbial enzyme assays yielded inconsistent data. From two consistent data sets, the dusts appear definitely stimulatory to microbial activity. First, the addition of dusts to composting materials raises the temperature of the composts. Second, additions of dust increase the rate of decomposition of soil organic carbon, both in field test plots and in pot test experiments. As in investigations by others, tests on poorer soil appear to demonstrate greater potential benefits of rock dust amendments.

David Miller, Oberlin College

Exploring one specific potential benefit of soil remineralization, Orville A. Levander of the USDA's Vitamin and Mineral Nutrition Laboratory (Beltsville, MD), discussed the widely varying selenium levels in soil throughout the world. An essential trace element, yet toxic in excessive amounts, the selenium content of staple grains in different regions has been reported to exceed three orders of magnitude for the same foodstuff. Several approaches have been taken in efforts to remedy the situation including foliar application by spraying crop plants, top dressing of soils with fine pellets, addition to fertilizers used in farming, and the direct addition of selenium to the feed of livestock and poultry. Because many of the biogeochemical processes operating on a global scale to influence the ecological cycling tend to remove this essential trace element from the food chain, active intervention to rebalance its natural flux in the environment may continue to be necessary. Soil remineralization could provide an effective and safe method for doing so.

Organizing Committee member Rick Meininger (National Aggregates Association) recounted the efforts of the NAA in exploring the use of mineral or new product fines in various SR applications. These fines, generally material passing 200–mesh screen (74 um), must be disposed of properly. He urged continued industry cooperation in developing a protocol for physical and chemical testing of them; in the management of a database for information about them; and in coordinating the stockpiling and transporting of different lots of them for a five–year period to aid interested researchers. He was joined in that recommendation by Robert J. Able, Dan Gernatt Gravel, Inc. (Collins, NY).

Bernadette Marriott, Director of the Food and Nutrition Board, National Academy of Sciences

Lawrence P. Quinlivan (National Stone Association) of the Organizing Committee remarked on the operation of the agricultural lime industry and the potential for the application of some of its products in combination with sewage sludge, compost, yard waste, animal waste, excavation soil, or mineral processing as soil amendments. Aldo F. Barsotti, U.S. Bureau of Mines, Organizing Committee member, provided an overview noting that the estimated but uncertain amount of fines generated, though relatively small compared to other mining operations, may be as much as 200 million short tons annually. Economic considerations will most likely limit bulk quantities for soil replenishment to a local or regional basis. [It should be pointed out, however, that the general application of these fines may literally be a matter of survival for the human species and, as such, would more than warrant efforts, comparable to that of a Manhattan Project for the atomic bomb, substantially beyond regional concerns. That the political effort needed to effect such a commitment would be enormous should not limit the circumspectness with which the undertaking is pursued.]

Findings of the significant benefits of soil remineralization add further perspective to the documented direct ingestion of soil by mammalian and avian species throughout the world. Bernadette M. Marriott, Acting Director Food and Nutrition Board, National Academy of Sciences (Washington, DC) explored the meaning of geophagy or soil eating. The behavior transcends culture, geographic location, and socioeconomic class. Although there are conflicting hypotheses as to the nature and rationale for the behavior, there seem clearly to be nutritional and physiological benefits derived from the practice.

Tara Zadeh, General Counsel for the Commonwealth of Massachusetts Department of Food and Nutrition (Boston, MA), brought the sobering reminder to the advocates of soil remineralization that the majority of individuals in the regulatory and environmental communities are totally unfamiliar with the concept of soil remineralization. The use of a unique process for manipulating the environment may implicate existing local, state, and federal environmental land use laws or prompt legislators and regulators to create new laws and regulations. Thus, as with advocates of any new concept, proponents of renourishing the soils through remineralization should be prepared to answer a range of questions.

Tara Zadeh,
General Counsel of the Massachusetts Dept. of Food and Nutrition

She advised advocates of remineralization to anticipate generalized skepticism and opposition from regulators and activists unfamiliar with the sound basis for the practice by developing and bringing that information effectively to their attention. Data addressing a wide variety of concerns including run–off, leaching, accumulation in water bodies, possible damage to aquatic and plant life, endangered species, protection of water supplies and wetlands impacts should be collected and made available in easily understandable formats.

In addition, the research community exploring remineralization will need to address more practical legal and regulatory issues relating to the actual commercial use of remineralization and the products grown in mineral treated soils. These issues include environmental

> ***In addition, the research community exploring remineralization will need to address more practical legal and regulatory issues relating to the actual commercial use of remineralization and the products grown in mineral treated soils.***
>
> ***Tara Zadeh***

Agrogeology was well represented at the conference through speakers (left to right) Ward Chesworth, William Fyfe and Michael Powell

impacts, worker protection, public health, and consumer concerns. She believes it to be essential that sufficient scientific data exist to substantiate any particular labelling claims (such as increased soil fertility, increased nutritional values, or pesticidal properties).

That well-meaning observation, along with the statement that good information will lead to intelligent debate which should lead to intelligent regulation, fails to acknowledge the protective role that western science plays in shielding Euro–American civilization from reality. Unless some circumstance such as the increasingly pervasive awareness of doom forces a revision of the generative kernel of western culture, the initiative for a substantial soil remineralization effort will fail. One ought to note, however, that the soils that have nourished the human race and all of the species on the planet for several million years were made of rock dust, so it cannot be all bad. While the conditions for optimal use of rock dust can be determined, it is unlikely that we recently arrived scientists and other inhabitants, who seem unable to stop fouling the planet, can do a better job of specifying criteria for permitting its use.

James W. Schmitt, Granite Rock Company (Watsonville, CA), summarized industry's perspective and necessary activities if the use of new product fines and related materials is to be commercially successful in soil remineralization. More information is needed on the benefits of aggregate fines. How quickly and for how long do they work? What mechanisms are responsible for their success? What is the range of compatibility of soils, crops, and fines? What is the availability of nutrients from the fines?

The industry needs to systematically determine the composition, properties, and nutrient availability of each of its aggregate fines and to learn the language of agronomy and the needs of the new customer base. He urged the industry to cooperatively develop technologies, test methods, and quality standards. This will require changing the mind set regarding fines including educating staff about the opportunities and soliciting help from it to meet the challenges. Aggregate fines represent a large reserve of compositionally consistent naturally occurring co–product generated by the processing of sand and gravel or crushed stone into construction aggregate. Their application to agricultural land is only one of the markets that the industry should get organized to explore.

W. Doral Kemper, USDA/ARS National Program Staff (Beltsville, MD) reviewed the research needs posed by the interest in using rock dust in agriculture. While expecting to more fully define those research needs based on information presented at the meeting, Kemper viewed the starting point as the need to know where there are significant or incipient deficiencies of these nutrients in plants, animals, and/or humans. He noted that maps have been developed on a few of these elements such as zinc and selenium and that others may be in preparation. With defined areas of deficiency and chemical analyses of rock dusts available within reasonable hauling distance of the area of deficiency, greenhouse and field studies using dusts with the most potential for providing the deficient element should be conducted. With this best fit established, an economic analysis of its use should follow. With such information, industry should be able to establish rock dust as a viable product line.

The Promise and Problem or Soil Remineralization

As outlined by Counselor Zadeh, unfamiliarity with the concept and background of soil remineralization on the part of the public and its legislative, regulatory, and environmental representatives may engender much caution and concern in the community. Indeed, the advocates and practitioners of soil remineralization must present the case fully and persuasively. They must proceed judiciously to develop the technical, logistical, and financial information for the application. As suggested earlier, however, neither the crucially important promise nor the culturally threatening problem posed by soil remineralization have been addressed. Handicapped from the outset because it appears to be too simple, the probability for the success of soil remineralization efforts will sink further if those considerations are not addressed.

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بسم الله الرحمن الرحيم

MIN PLUS U.S.A., INC.

The fertilizer with the Golden Star
to remineralize the Earth

Announcement

In this century, we have reached the moon, developed the airplane and the computer, and enjoy incredible communications. Despite this, we have failed towards the only home we have – the good Earth.

Even today, a few square meters of earth, some water and a few hours of daylight is the cheapest and most efficient food factory. No technology or computer can even begin to compete, let alone duplicate a tasty fruit or vegetable, or the edible vegetable oils. Already in France, Renault has developed an engine that will drive 30,000 miles on oil from 2.5 acres of sunflowers. Finally, there is a replenishable source of energy.

This is possible only through sustainable agriculture, and sustainable agriculture is possible only through proper remineralization of our earth, and by giving her a chance to regenerate and produce for us. If we expect the earth to serve us, we must, in turn, serve her.

My father came from Palestine and my mother from Syria, and I was born in Lebanon nearly 61 years ago. In 1936, my father started Agricultural Materials Company which now covers all the Arab world.

I left home at an early age and travelled the world on my own but I recall very clearly how my father started and how his company grew. During the 40s and 50s all agriculture was organic and there were always plenty of nourishing vegetables and fruits with good taste and high yield. Later, the branches of my father's companies, which are now managed by my step-brothers, started to introduce chemical fertilizers and many kinds of pesticides. This has and continues to insure the financial success of my father's organization.

Eventually, my father acquired a farm which is now a great success. The farm is 100% organic. He refused to allow any chemical fertilizers and prohibited pesticides. The result has been an abundance of good and nourishing food, which I enjoyed during many visits to him in his house and on his farm.

I am now in the same business as my father and am concentrating all my efforts on supplying Mineral Fertilizers, at a reasonable profit to myself, so that farmers can remineralize their earth.

I have found very suitable mineral fertilizers in the USA and also in Australia, which is closer to the Arab world. I urge anyone reading this to contact me for further information, samples, and prices, and to benefit from my worldwide experience and help me in my dedication towards sustainable agriculture. I hope I may be able to assist in the common cause in order to establish, on a permanent basis, sustainable agriculture throughout our world.

Omar Khalil Miqdadi, President
Min Plus USA, Inc.

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A company working for sustainable agriculture

Where Do We Go From Here?

Andrew Euston, AIA

Ahead is the emergence of a major global industry that will transform agriculture, diet, and health. The wide variety of well-informed speakers, including serious investigators in agricultural science, nutrition, and forestry have told parts of the story.

This historic gathering of well informed speakers will advance the latent miracles awaiting our somnolent civilization through remineralization. Ahead is the emergence of a major global industry that will transform agriculture, diet, and health. The wide variety of well-informed speakers, including serious investigators in agricultural science, nutrition, and forestry have told parts of the story. The full story is yet to unfold. Rock dust will transform our culture's perspective on nature, technology and change. It is so simple to grasp and yet a vast array of consequences will flow from its implementation. The process of its introduction will be the real story, for that will teach us all a big lesson about what's possible.

The potential of this resource to modern civilization has been held back by the natural skepticism we all have; by traditional conservatism in farming and by barriers in agricultural industry to technical and scientific reforms of any appropriate kind.

A most valuable thing to do in view of these impediments is to encourage direct local testing with available fines (powdered rock dust) wherever growers and foresters are willing to try it. The gradual building of results from local acceptance will be by far the most valuable approach.

Concerned individuals, firms, and educational institutions need to become grassroots advocates for remineralization. Successfully introducing this topic as a new idea into agriculture's diverse cultures depends on who makes the first moves and what they encounter. Where local evidence builds and people can attest to the practical benefits, the ground will emerge for its acceptance. Acceptance will become the norm as the idea merges into common use, as the soil sciences catch up and as the picture of success begins to tell its own story.

This agenda is a basic eye opener for all those concerned about sustainability. To win acceptance, a story needs to be built, cases need to be aggregated, and tests need to become truly commonplace. Individuals can accelerate this process by taking on some local public speaking, some local promulgation, and some creative local collaboration on their own. Because rock dust has a ways to go before acceptance in the U.S., it is important for it to have the widely diverse public support of ordinary citizens.

In two or more years down the road, we'll have more facts, cases, and slides, etc. to make our points. Science is certainly influential, but common sense and concrete outcomes don't need science to reach people. Science struck out in the acid rain crisis; it was passive during a decade of known ozone layer damage. To rely passively upon shifts within a science that is so often bought to tell us what to believe is not the practical answer. Neither is it helpful to invite the courts to arbitrate before people have had the chance to try out their own solutions on a small scale. Eventually rock dust will become systematized as an information-rich, trans-national, data-exchange driven product. But first hundreds of concerned individuals must become convinced on a first hand basis of rock dust's undeniably practical value.

Andrew Euston is a "founder" of sustainability citizenship as a movement in the U.S. His work since 1968 as lead Federal urban design advisor (within H.U.D.) has involved major campaigns for transportation-land use integration, local urban environmental design administration, community energy systems and since 1986, sustainable community development.

Communities are Markets for Rock Dust Fines

- Municipal tree programs for parks and streets. ("Urban forestry" is a big movement in the U.S. Cincinnati already has a Master Gardener movement.)
- Community gardens, a growing inner city agenda, quite extensive in some areas.
- "Edible" landscapes, a growing suburban agenda.
- Farmer's markets, a place to introduce specific marketing messages, and to enroll community groups to stage promotions with shoppers and local growers.
- Landscapers and landscape architects.
- The community supported agriculture (CSA) movement.

Some scenarios for moving mineral fines to market:

Public talks: Offer to introduce remineralization to a variety of local groups, starting with friendly ones. They'll learn from the simplest of messages. Present your story as part of a regular business meeting of soil boards, church groups, garden societies, or before kids in a school you are familiar with, etc. This simplicity enables the slow build up of your own tools and tricks, e.g. visuals.

Strategic initiatives: In your area find some local synergist – someone who'll see an angle, a way through for product development, marketing, service or public relations and come out the other end with a strategy. Some place to start might be demonstrations, or to place remineralization within some institution's agenda. An example: getting the Roger Tory Peterson Museum, newly under construction in Jamestown, NY, behind rock dust as a soil amendment for bird sanctuaries.

Peterson is the world famous author of birding guide books. Birds, like cattle, respond to plants that contain mineral diversity automatically. My own yard has rock dust. Birds of all kinds flock to it to eat the berries, bugs, and grubs there because they pick up on the higher energy vibrations, the smell intensities, tastes, etc., (a la nutritionist Bernadette Marriot's talk at this USDA forum). It is the same with cattle that have a choice between remineralized grasses and ordinary ones. If the rock dust story should get through to an organization such as the Peterson Museum, it could ultimately reach millions of people.

The most valuable thing to do ... is to encourage direct local testing with available fines (powdered rock dust) wherever farmers are willing to try it. The gradual building of results from local acceptance will be by far the most valuable approach.

Tackle academia: Pick targets which are close to agricultural institutions. An example is the Ecovillage at Ithaca, N.Y. It has 170 acres overlooking town and plans to use 20% of the land for cluster housing. The rest will be farmed or in ponds and marshland. The Ecovillagers are a willing audience. As they introduce remineralization, they'll be a major outreaching source of information for the budding eco-village or co-housing movement. (Co-housing is a socio-economic interactive condo variant.) There are several hundred co-housing groups now in some stage of formation in the U.S. Many are near universities, and some are near agricultural schools.

There are surprise linkages to be found in the global village. Ithaca's Ecovillage is aligned with the government of Senegal, West Africa, where the Third International Eco Cities Conference will be held in January 1996. (The first was in Berkeley, CA, the second in Adelaide, Australia.)

There are communities that have a wide spectrum of sustainability agendas underway. The agriculture and health aspects of remineralization fit into some of these. Regional and metropolitan economic and quality of life agendas exist where remineralization can play a role to strengthen the urban-rural ties of communities, farmers and food sellers.

There are approaches that remineralization can help mobilize. Some 60-70,000 firms have started over the past few years in the U.S. as environmentally based businesses. They build on the same principle as remineralization, that business that can solve ecological problems while creating jobs and prosperity. (Read Paul Hawken's *The Ecology of Commerce* and *In-Business* magazine for a deeper understanding of these kinds of enterprises.)

A panel of diverse people with different stories is a good way to present remineralization at such gatherings. The story for general audiences needs to be about more than the technology and its products.

There are numerous groups now turning to the question of sustainability where the rock dust story can begin to be heard. The National Association of Counties is one such group, the American Society of Landscape Architects is another. The place to start, is where people are looking for healthier, more affordable and safer alternatives for themselves and their communities.

Connecting is Another Way to Promote Remineralization

- Gravel pit and stone quarry operations.
- Economic development people, especially in states with glacial rock deposits.
- The "carbon sequestering" movement.
  Usually they think trees and have yet to consider the amount of carbon that soil microbes can lock up.
- Dealers of mineral supplements and their customers.
- Holistic health people. Many understand the role minerals play in health. They now buy mineral-rich supplements, e.g. Celtic sea salt, seaweed, spirulina and blue green algae. They'd be interested in fully mineralized vegetables, fruits, and grains.
- Community Supported farming groups

Robert Able
Gernatt Gravel, Inc.
NAA Task Force on Remineralization

As anticipated, the forum turned out to be a pivotal meeting regarding presentation of the utilization of various rock dust products for soil remineralization to the USDA and US Bureau of Mines.

The assemblage of industry, academia, growers, scientists, government, nutritionists, and other interests is what was needed to stimulate further progress in the concept. To my knowledge, this is the first time the many beneficial concepts of soil remineralization have been reviewed by such a diverse group.

An air of excitement permeated the coffee breaks, with the attendees anxious to speak to those in attendance. Unfortunately, this one-day conference could easily have been a three-day event.

Host personnel at the USDA were extremely cordial in providing a tour of the facilities and explanation of the test plot allocated to testing of several rock dust products.

The National Aggregates Association is currently developing a suggested test program for further documentation of SR merits.

Overall, our industry was pleased with this first meeting with the USDA.

June Taylor
N-VIRO

This meeting was extremely educational. I consult for N-Viro International, which recycles sewage sludge along with “rock dusts” in the form of cement kiln dust and other dusts captured by air pollution control devices. * These are alkaline dusts with high mineral value. N-Viro Soil is sold as an “organic” agricultural liming material. I had always focused more on the “organic” part of the product than the mineral dusts. I learned a lot about their value at the Beltsville conference.

I learned that many of the beneficial attributes I've come to associate with organic soil amendments are also true of “rock dusts”, i.e., improving water holding capacity, increasing soil microbial activity and increasing crop productivity. Of course, N-Viro Soil does what Mother Nature does in good soil – combine organic residues with rock dusts.

As a westerner, my ears perked up to hear that rock dusts increase the water-holding capacity of the soil. This is an extremely important attribute of organic soil amendments, both in the West, where they significantly reduce the need for irrigation by 25-30%, and even in water-rich areas where they can help hold water and reduce flooding. What would the flood of ‘93 have looked like if the Nation's bread-

> ***... perhaps in the due course of time, we will see remineralization move close to the mainstream. That will not come to pass overnight and not without major efforts to educate and to have the product at hand in every possible retail outlet so that everyone has easy access and knows the advantages of using the product.***
>
> **Edward O. Welles**

basket had a blanket of healthy organic and mineral-rich soil?

Another thing that surprised me at the conference was to see a whole new group of folks getting interested in soil fertility and sustainability issues – the Aggregates Industry. Several times it was pointed out that remineralization advocates are about where sewage sludge was 20 years ago; it looks like a good idea, but enough hard scientific data to support using rock dust to improve crops isn't in yet.

Those who went through the "sludge wars" may be able to help the remineralization cause avoid a few minefields. But, remineralization is a much easier sell, not fraught with the discomfort and tabu often associated with human wastes. Plus, rock dusts smell just fine!

*Examples are dusts captured at coal burning power plants, steel mills and other industrial facilities. The alkaline dusts react with wet sludge producing a heat reaction (52 to 60C) which along with the increased pH kills the pathogens in sludge, effectively pasteurizing it. (See *Forestry and Sewage Sludge Research Packets* on page 79)

Sam Catalano, MIN PLUS Australia Mineral Fertilizers

The United States is in the position I was in eight years ago. We were not getting anywhere chasing government agencies. Five years ago, we started doing meaningful research funded through Queensland University for sustainable agriculture. It began with greenhouse pot trials and went on to field trials, started off on both degraded and good soils. You should get funding to do research where there is control of the research; this is the only way to move forward now.

In Australia we have a Research and Development system – you can claim 150% for tax purposes in a taxable situation and this encourages research in return for tax advantages. You could lobby politicians for this to get incentives for research.

Once industry is in control of research, it knows what needs to be done and what the end user wants to see. Government doesn't necessarily do this.

You should have a conference every 1-2 years to bring data together and see where the research is going.

Another idea is to levee 10 cents per ton of material sold into a pool and use that for research funding. There doesn't seem to be too much interest in that so far with those I spoke to at the conference.

Edward O. Welles American Biofuels Assn.

It was a splendid initiative to organize and stage the event at Beltsville. I regret I did not attend the entire event, but even so, I feel somewhat up to date and am encouraged to observe such a wide range of activity in the remineralization area. To be sure, that is nothing new as evidenced in your journal, but nonetheless, the stone producing and processing industry is taking a truly serious look as I see it; perhaps in the due course of time, we will see remineralization move close to the mainstream. That will not come to pass overnight and not without major efforts to educate and to have the product at hand in every possible retail outlet so that everyone has easy access and knows the advantages of using the product.

Harvey Lisle, Author of The Enlivened Rock Dusts

I think we could say that the recent forum on SR at Beltsville was successful. I was pleasantly surprised to learn that the USDA takes this subject very seriously. I know that it was a lot of work to put on the program and I thank you.

Judy Roylance Roylance Environments Planters II

The conference ended with a voice of concern from the industry, a plea for research to indicate which rock yields the most beneficial dust for which soils, growing what plants at what specific application rate. The Department of Agriculture indicated a willingness to do what it could by allocating funds for research and increasing appropriations for such research in the 1995 Farm Bill. One compelling speaker with an aggregate company in Texas suggested that shipping prices alone would indicate a local approach and indicated his willingness to donate land and material to work in conjunction with a local farmer and research scientist from a local university. There was concern voiced about a need for universal protocols for such research. The leaders of the participating groups agreed to keep communication open and to meet again.

So the seed has been planted: governmental interest in remineralization has begun. What has happened since last May? Where were the farmers and foresters? Arresting climate change could be powerful motivation for prompt action. Is it wise to downplay this connection? Are any local projects underway, utlizing local sources of aggregate fines, extension agents and universities? We need to nourish this interest with our attention.

AN OVERVIEW OF THE REGIONAL NATURE OF MINERAL FINES

by Dr. Aldo Barsotti, U.S. Bureau of Mines

Much has been said and written about the actual and potential use of mineral or "rock" fines to replenish and sustain both the macro- and micro- nutrients of agricultural soil. One of the principal focuses of this conference (Soil Remineralization and Sustainable Agriculture) is on the potential use of mineral fines, sometimes referred to as "waste" or "by-product" from the crushed stone and sand and gravel industries, also known as the aggregate producing industry.

The definition of fines according to the Bureau of Mines is: "Very small material produced in breaking up large lumps... The fine fraction of a sediment or the product of rock crushing, particularly that which passes through a grading sieve. The fraction of sand and gravel finer than 0.074 millimeters in particle diameter. The portion of a soil finer than a number 200 U.S. Standard sieve. What is important to note is that we are dealing with material of particle size less than 74 µm (under 200 mesh) which, at certain times and economic conditions, may or may not be considered marketable.

To some there is a perception that all "fines" are always considered waste. In fact, this is not that case since often, for specific operations, with distinct quality of fines, there can be a market for the fines sometimes at a very high unit value. In other words, what may constitute waste fines at one place and time may be a marketable product at another time or location. This is one of the reasons for the inconsistencies in different estimates of the quantities of fines which may exist.

Like all processes, mining generates waste. Unlike other mining, such as for gold, silver, and copper, and most other minerals, production of crushed stone and sand and gravel generate relatively little waste per ton of product [Rogich, 1993]. With few exceptions, in aggregate production, a minimum of 85% of what is extracted is used as product. Nevertheless, while a relatively small amount of waste or fines are generated per ton of aggregate produced, the amount of fines generated is considered to be significant because of the large quantity of aggregate produced throughout the country (over 2 billion tons in 1993). Estimates range between 100 and 200 million tons.

Also important is that fines generated in aggregate production are minerologically and chemically unaltered. In fact, fines generated from the crushing of stone are minerologically similar to the source rock and products sold. Most importantly, the fines generated by the aggregate industry are essentially benign, and for that reason make excellent candidates for consideration as having potential for soil remineralization.

On the basis of tonnage, the aggregate industry is the largest nonfuel mineral industry in the country with operations located in almost every county of the country. According to recent Bureau of Mines estimates, the aggregate industry is made up of over 6000 companies operating over 9000 pits and quarries.

Sand and Gravel: Quantity and Location

In 1992, there were over 4000 companies producing construction sand and gravel from 6000 operations [Tepordei, 1993]. Construction sand and gravel was produced in every state in 1992, the leading states in descending order of tonnage were California, Michigan, Ohio, Texas, Washington, Minnesota, Illinois, Arizona, New York, and Colorado.

Given ranges of available fines at between 5 and 15 percent of production, one would expect that between 40 and 121 million short tons of fines were generated from sand and gravel operations in the United States in 1992. For the five leading producing states, which together accounted for a little over 30 per cent of total production that year, between 12 million and 37 million tons of fines would have been available, mostly in California. Bear in

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mind these are extrapolations and do not represent actual quantities.

Quality and Nature of the Fines

Very little site-specific minerological information exists on sand and gravel operations. What is known is that the nature and composition of sand and gravel deposits vary significantly based upon geological and depositional environments. Generally, silica (mostly quartz) is the major constituent of most commercial sands. Feldspars, mica, iron oxides, and heavy minerals are also common but make up a relatively small portion of the composition. The particle size and mineralogical distribution in sand and gravel deposits are determined by the mode of sedimentary formation. The principal types of sand and gravel deposits are stream, glacial, residual marine, and lake.

An averaging of the analysis of 2 samples taken from glacial gravel in New York State would indicate a dominance of silica and alumina, with smaller quantities of feldspars, limestones, dolomites, iron bearing and heavy minerals such as hornblende, ilmenite, rutile, and monazite [Meininger, 1993]. An array of elements in trace amounts were also identified. To what extent this is reflective of glacial material as a whole is unclear at best. Because of the variability of the geologic origin of glacial material, one would expect some degree of variability in fine composition in different areas of glaciation.

Crushed Stone: Quantity and Location

In 1991, over 1 billion short tons (5,280 lb/short ton) of crushed rock was produced for consumption by 1600 companies from over 3200 operations with over 4000 quarries [Tepordei, 1993]. Crushed stone was produced in every state except Delaware. The leading states, in descending order of volume produced, were Pennsylvania, Illinois, Texas, Florida, Virginia, Missouri, Ohio, North Carolina, Kentucky and California. Their combined production represented almost half of the national total.

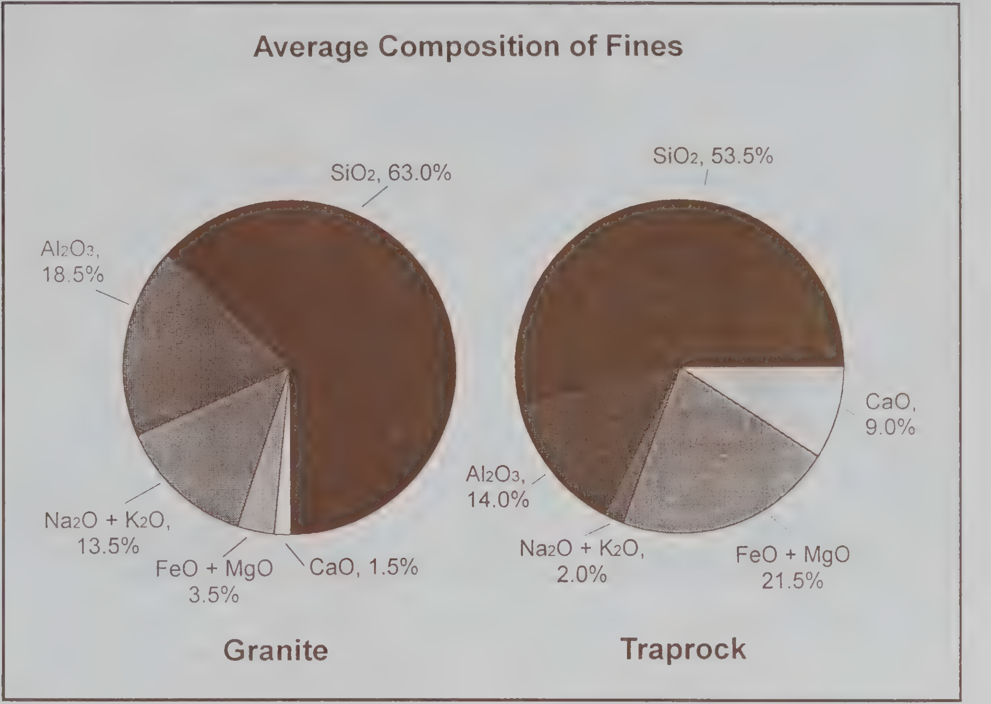
About three-quarters of the crushed stone produced in 1991 was limestone and dolomite from over 2300 operations located in 47 states. With the exception of North Dakota, Louisiana, and Delaware, limestone is produced in every state of the Union. Crushed stone from rock classified as granite and traprock, the latter term representing diabase and basalt, account for a quarter billion tons of product sold or used by that industry in 1991. Crushed stone from granites is produced in 37 states. Four states in the southeast, in descending order of tonnage, North Carolina, Georgia, Virginia, and South Carolina, accounted for almost two-thirds of total domestic production in 1991, over 200 million short tons. Traprock was quarried and sold as crushed stone from 30 states, the most dominant ones being Oregon, Washington, California, and Virginia. These states accounted for over 53 percent of basalt and diabase rock crushed and sold in 1991.

It is estimated that between 55 and 165 million tons of fines were generated from quarrying and crushing stone in 1991. Most of the fines, between 36 and 108 million tons, or 66 percent of total fines, were generated in the production of crushed stone from limestone. Over 54 percent of that limestone fines would be located in 8 states. In descending order of tonnage produced, these would be Texas, Illinois, Florida, Missouri, Kentucky, Ohio, Pennsylvania, and Tennessee.

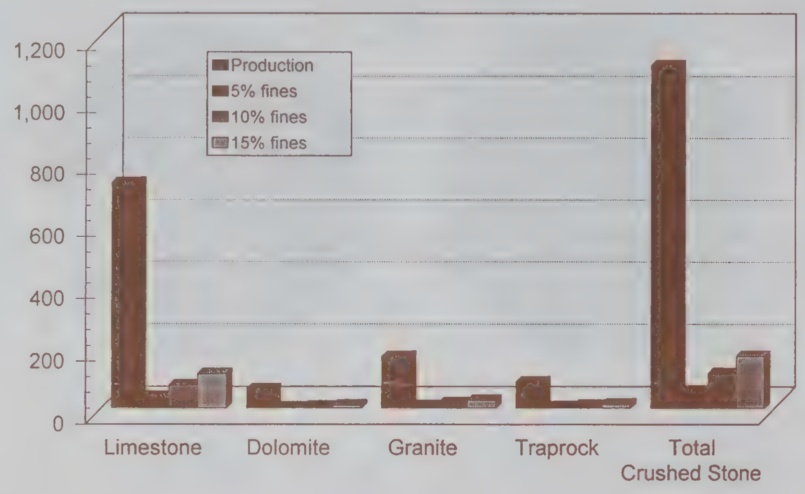
Between 8.2 and 24.6 million tons of fines are estimated to have been generated from the production of crushed stone from granites in 1991, mostly in North Carolina (1.9-5.7metric ton), Georgia (1.8-5.4mt), Virginia (.95-2.9mt), South Carolina (.65-2. 0mt), and California (.42-1.3mt). These states account for 70 percent of the granite crushed that year, and as much as 17 million tons of fines of granitic composition were generated. Extrapolation from 1991 production figures for traprock suggests that between 4.2 and 12.5 million tons of fines were generated, over two-thirds of which came roughly equally from 5 states: Oregon, Washington, California, Virginia, and New Jersey.

Composition of Fines

Limestone and dolomites are essentially carbonates of calcium and magnesium. However, most limestones contain varying degrees of impurity or quantities of other minerals [Pirsson, 1955]. These may include quartz, silica, clay minerals, py-



Average Composition of Fines



U.S. Crushed Stone Production in 1991 and Estimated Amounts of Fines
(Million short tons)

rite, celestite, halite, gypsum, and other minerals accumulated during and well after deposition. Trace amounts of other minerals and elements may be present but this can only be ascertained through site-specific sample analysis.

Granites are made up principally of equigranular quartz, feldspars, and other minerals, such as mica and biotite. Feldspar, mainly orthoclase (potassium aluminum silicate), predominates and is readily recognized. In granites, silica content can range from 56 to 70 percent of the composition and alumina between 15 and 22 percent [Pirsson, 1955]. Sodium and potassium oxides combined can range between 10 and 15 percent while iron and magnesium oxides are present at only about 3 to 4 percent.

The name trap is often used as a field term to designate the rocks ranging from dolerites to basalts [Pirsson, 1955]. These are dark rocks containing high amounts of iron and magnesium and little or no quartz. Silica is present mostly as silicate in feldspars and the iron and magnesium oxide content is much higher than in granites, between 18 and 22 percent.

The pie diagrams (Fig.1) represent an average composition for granites and traprocks. They represent an adjusted mid-range in mineral composition of light colored and dark colored igneous rocks. Again, the significant difference between the two is amount of silica and relative amounts of iron and magnesium versus sodium and potassium. Using these compositions as a proxy, in the absence of better data, an attempt was made to demonstrate the range in quantity of component material that could be available in granite and traprock fines generated from crushed stone operations at the national level in 1991.

Given our assumptions, over half of the material in the fines for both granitic and basaltic types of rock would most likely be silica, possibly as much as 15.5 million tons for granites and 6.7 million tons for traprock. Between 1.6 and 7.9 million tons of alumina and sodium and potassium oxide mostly as feldspars would be present in the granitic fines, while maximum amount for these components in traprock would probably not exceed 2 million tons. Between 1.8 and 4 million tons of oxide equivalents of calcium, iron, and magnesium, most likely be in crystals of olivines, hornblendes, pyroxenes and amphiboles. No doubt, metallic sulfides and oxides of other elements would be present in trace amounts depending on the source.

What this suggests is that at the national level, there would seem to be an abundance of mineral material in aggregate fines which would be potentially available for soil replenishment. Extending this down to the state levels would indicate that, for at least those states dominant in these type of resources, an abundance of mineral material in the fines would be available as well. This would be the case for fines from the sand and gravel also. Whether it is the appropriate material for replenishing depleted nu-

Average Composition of Selected Glacial Gravel Samples

Component	Weight percent
SiO_2	70
Al_2O_3	10
$Na_2O + K_2O$	2.5
$FeO + MgO$	6.6
CaO	4.9

Other lesser and trace elements:

Ti	Zr	Nd
Zn	Rb	Y
As	Co	Ni
Ba	Ce	Sr
La	Mn	

Total of these elements is less than 0.5%.

trients in specific soils within those states would still need to be established.

Summary and Conclusions

In summary, because of the amount of mineral material removed from the ground annually, and the number of operations and their location in almost every state and county, the aggregate industry is the major source of potential mineral fines for soil remineralization. The fines generated by the aggregate industry are more closely related to the mineralogy of the host rock than the rest of the mining industry. And finally, given some assumptions about the nature and content of the fines, extrapolation of Bureau of Mines data gives favorable indications that for many states, ample quantities of certain minerals with potential for soil remineralization would be available.

There are a number of caveats which need to be stated about some of the assumptions and resultant observations. First, there is no ideal or average granite or traprock, or limestone for that matter. Much of what was reported to the Bureau of Mines as "granite" or "traprock", for example, was most likely from an array of igneous and perhaps metamorphic rock having wide ranges of major and minor mineral combinations and trace elements. Secondly, in the crushing of rocks, such as granites, it is likely that more friable minerals in the host rock will disintegrate to sizes under 74 µm easier and in greater quantities than minerals such as quartz. Thus it could be that while the fines may be mineralogically similar to the host rock, the proportionate amount may not.

With the exception of high value-added material produced and sold from aggregate operations, such as pulverized stone for specialty or functional uses in paints, paper, pharmaceuticals, and plastics, most material produced by aggregate operations have low bulk value, also referred to as high place value. This means that the market for this material will be greatly limited by shipping and handling costs. In other words, there is a definite economic limit for the geographic market of the various products from each stone quarry and sand and gravel pit. Unless it can be shown that these fines should have high value, matching fines to soils with specific needs will most likely occur on a local basis or on a regional basis at best. It is unlikely that bulk amounts of granitic fines from say, California, will ever reach soils in say, Iowa, even though there were to be a match.

Conclusions

- Aggregate industry is a major source of mineral fines
- Composition of aggregate fines is directly related to geology and mineralogy
- Soil replenishment with mineral fines is most likely on a local or regional basis
- Matching of fines with local or regional soil requirements is needed.

A final recommendation would then be that further research be done on analyzing fines and understanding the replenishment requirements of agricultural soils for minerals. Any testing of fines for potential remineralization should be done with soils within the geographic range of their marketability.

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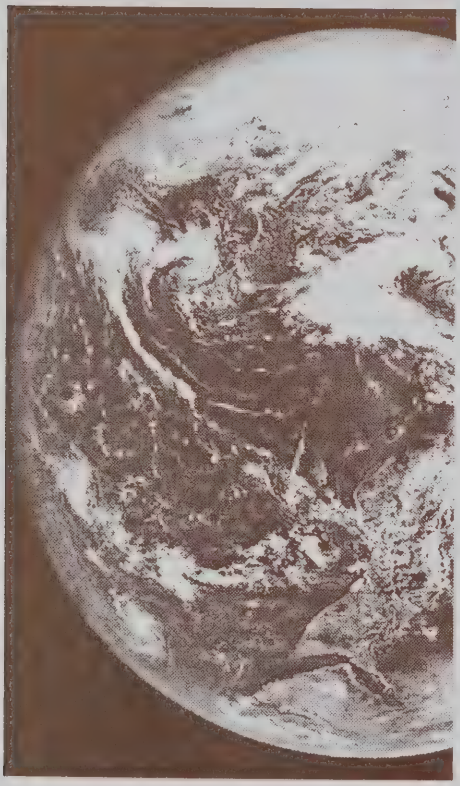
Using Rock Dust Helps To Control Atmospheric $C0_2$ Buildup and the Greenhouse Effect

Donald J. Supkow, PhD



Dr. Supkow holds degrees in geology from Rutgers University and the University of Maine and a PhD in hydrology from the University of Arizona. He is a professional hydrologist registered in Delaware and Arizona and works as a consultant in the remediation of contaminated soils and aquifers. This article is an excerpt from a longer technical paper on global warming and climate change which Dr. Supkow is preparing for publication in a technical journal. Anyone interested in obtaining a copy of the technical paper may contact Dr. Supkow at 28 Sefton Circle, Piscataway, NJ, 08854, U.S.A. Phone (908) 752–3189.

Introduction

The atmospheric CO_2 content has varied significantly during the past 150,000 years oscillating between about 200 and 300 ppm (Barnola et al, 1987). However, during the period between 1959-1989, the atmospheric CO_2 content has risen from about 315 to 350 ppm (Keeling et al, 1989), with 1995 projected to average about 360 ppm. The modern rate of atmospheric CO_2 buildup, therefore, is many times greater than previous rates.

The scientific community estimates that global temperatures are currently rising at the rate of about 0.45 degrees C. per century (Balling, 1992). There is still some controversy regarding the rate of global temperature rise and whether global temperatures may actually be decreasing or about to start decreasing (Hamaker et al, 1982).

Public perception is that the global temperature rise is caused by the burning of fossil fuels and forests which in turn is raising the atmospheric CO_2 content faster than natural processes can remove the excess CO_2 from the atmosphere. The concept that global temperature rises are caused by atmospheric CO_2 buildup is referred to as the Greenhouse Theory (Arrhenius, 1896; Chamberlin, 1898; Plass, 1956; Budyko and Ronov, 1979; Fischer, 1984). Other factors which are believed to be contributing to global warming are deforestation, desertification, urbanization and the buildup of greenhouse gases other than CO_2 (Balling, 1992). In modern times atmospheric scientists have developed sophisticated computer models which attempt to predict how much global temperatures will rise at various assumed rates of atmospheric CO_2 buildup (Krause et al., 1989; Houghton et al., 1990, Annex). Scientists world wide express concern as to how global climates may change as a result of the atmospheric CO_2 buildup (Mintzer, 1992). Anticipated changes include overall global warming, global cooling, or dramatic changes in weather patterns such as increased storm violence or shifting rainfall belts. Most environmental scientists generally agree, however, that atmospheric CO_2 buildup is not good for the environment. Scientists and environmental activists generally propose that one way to reduce the rate of atmospheric CO_2 buildup (and presumably thereby reduce the rate of global warming) is to reduce the rate of burning of fossil fuels (Leggett, 1990; Ehrlich and Ehrlich, 1991; Mintzer, 1992). This paper will present evidence based on published data which indicates that it is technically feasible to halt the present buildup of atmospheric CO_2 content without reducing the existing rate of fossil fuel consumption.

The Global Carbon Cycle

The pioneering work of Berner (1991) has shown in a mathematically rigorous manner that under natural conditions the atmospheric CO_2 content is controlled primarily by the *rate of weathering of silicate rocks.* Berner (1991) showed that there are about 15 factors which control the atmospheric CO_2 content but indicated that the primary control factor is the rate of weathering of silicate rocks, such as granite, basalt, gneiss and extrusive volcanic rocks. Silicate rocks contain significant quantities of calcium and magnesium. As the silicate rocks weather, the calcium and magnesium combine with atmospheric CO_2 to ultimately form calcium carbonate and magnesium carbonate (Urey, 1952; Berner, 1991) which is deposited primarily in the oceans in the form of limestone and dolomite deposits. The CO_2 is ultimately returned to the atmosphere by volcanic eruptions.

Since the silicate rocks weather and remove CO_2 from the atmosphere, this means that the faster the silicates rocks weather, the faster CO_2 is removed from the atmosphere thereby causing the CO_2 content of the atmosphere to decrease (Berner, 1991). Berner (1991) gives several factors which control the rate of weathering of silicate rocks, the primary factors being the total land area exposed above sea level and the type of vegetation growing on the land. Under this scenario, it is obvious that with a lower sea level, the total land area of the continents above sea level is larger and therefore the area of silicate rocks exposed to weathering is greater. Vegetation growing on the land produces organic acids (Berner, 1991) which percolate downward and increase the rate of weathering of the underlying silicate rocks situated within the zone of percolating ground water. Berner (1991) indicates that the rate of weathering increased in geologic time because of: (1) the evolution of vascular plants which produce more organic matter and organic acids than primitive plants such as moss and lichens, and climaxed with (2) the evolution of angiosperms (broad leafed trees) which produce a prodigious quantity of organic debris which falls to the ground, decomposes and then produces significantly greater quantities of organic acids which weather the underlying silicate rocks at a faster rate than plants such as mosses, ferns and gymnosperms (needle bearing trees).

The angiosperm trees not only (1) serve as a mechanism to increase the rate of weathering of silicate rocks, thereby releasing calcium and magnesium which combine with atmospheric CO_2 to ultimately form limestone and dolomite deposits in the oceans, they also (2) serve as a mechanism to remove CO_2 from the atmosphere and lock it up in the form of organic debris which is buried in marine sedimentary deposits which ultimately form fossil fuels (Berner, 1991). The quantity of carbon stored in trees and surface vegetation (560 billion tons) and soil (1400 billion tons) is significant, but is small compared to the quantity of organic carbon stored in marine sediments (12,000,000 billion tons) (Hoffert, 1992). Although trees recycle much organic matter, part of the carbon which is fixed by trees in the form of leaves and other plant parts is eroded from the soil every year and reaches the ocean in the form of organic debris (Berner, 1991).

Increasing the Weathering Rate of Silicate Rocks

Under the natural scenario modeled by Berner (1991), the silicate rocks are weathered by organic acids which percolate downward from the overlying surficial soil zone. It is therefore easy to visualize that unweathered silicate rocks at depth below the land surface have the highest content of calcium and magnesium and that weathered rocks (including weathered alluvial soils) at and near the land surface have the lowest content of calcium and magnesium. This weathering process reaches its climax in tropical rainforest areas which develop laterite soils that are virtually devoid of calcium and magnesium. One can therefore visualize an historical process whereby the evolution of a rainforest is accompanied by the evolution of a laterite soil and a deepening of the interface between unweathered and weathered silicate bedrock. Because laterite soils have a high clay content and therefore a relatively low hydraulic conductivity, one can intuitively expect that the rate of weathering of the underlying silicate bedrock will tend to decrease with time as residual clay soil accumulates overlying the unweathered bedrock.

Considering the natural scenario of silicate rock weathering, one can visualize that: (1) the greatest *potential rate of silicate rock weathering* exists within residual top soil at the land surface because the top soil has the highest content of organic matter and microbial activity, which, according to Berner (1991), increases the rate of weathering of silicate rocks compared to underlying zones, and (2) under natural conditions the top soil zone has the lowest *actual rate of silicate rock weathering* because the top soil contains weathering byproducts rather than unweathered silicate bedrock.

The global rate of silicate rock weathering can therefore be increased artificially by adding finely pulverized silicate rock (commonly called rock dust in *Remineralize the Earth*) to vegetated soil at the land surface world wide. Weathering of the pulverized silicate rock in the soil will then extract CO_2 from the atmosphere and lock it up in the formation of calcium carbonate and magnesium carbonate deposits thereby reducing the atmospheric CO_2 greenhouse effect.

The average igneous rock contains 3.49 % Mg0 and 5.08 % Ca0 (Pettijohn, 1948). The weathering of 1 ton of pulverized igneous rock when added to soil will therefore lock up 0.0327 ton of atmospheric carbon. The burning of fossil fuels and forests contributes about 3.4 billion tons of carbon to the atmosphere annually (Oeschger and Mintzer, 1992). It would therefore require the weathering of about 106 billion tons of pulverized silicate rock per year to remove the 3.4 billion tons of excess carbon from the atmosphere each year. With a total global land area of about 33 billion acres (exclusive of Antarctica and Greenland) this would require adding a maximum average of about

3.2 tons of pulverized silicate rock per acre per year world wide. Obviously, adding pulverized silicate rock to desert areas would not be very effective because of the scarcity of precipitation and plant life in deserts. Therefore areas of rapid vegetation growth such as tropical rainforests would require higher application rates to maintain the annual 3.2 tons/ acre average rate. Such a project of adding pulverized silicate rock to soils world wide at an average rate of about 3.2 tons/ acre is feasible from an economic and a technical viewpoint. For starters, pulverized silicate rock is available as a low cost byproduct of rock quarries world wide. In New Jersey, U.S.A., pulverized basalt (locally called stone dust or mill ends) costs about $10.00/ton delivered within about 50 miles of the basalt quarries. When this supply of rock quarry byproducts is used up, crushed stone can be pulverized at an incremental cost.

In reality, significantly less than 3.2 tons of pulverized silicate rock per acre of soil would be required to be added each year to halt the buildup of atmospheric CO_2 because the weathering of the silicate minerals in the top soil releases trace elements which increase the productivity of tree and plant growth (Hamaker et al, 1982), sometimes by as much as a factor of four times. The increase of plant productivity would increase the storage of carbon in vegetation living above ground and in the underlying soils as well as increase the rate at which organic debris is deposited in ocean sediments. When factoring in the increased productivity of plant life, it can therefore be estimated that the average amount of pulverized silicate rock required world wide to halt the buildup of atmospheric CO_2 is in the range of 0.8 to 3.2 tons per acre, assuming a halt to world wide deforestation. Increases in the value of agricultural crops and timber products resulting from adding pulverized silicate rock to soils would offset part of the cost of applying the pulverized silicate rock to the soils world wide. When other benefits of soil remineralization are factored in, such as saving dying forests, reducing worldwide hunger and disease, averting disastrous climatic changes, and saving precious top soil, the cost of worldwide soil remineralization can be repaid many times over.

Acknowledgements

The author is indebted to Prof. B. H. Wilkenson of the University of Michigan Department of Geological Sciences for introducing me to the work of Robert A. Berner which forms the rigorous basis for demonstrating that adding pulverized silicate rock to soils can control atmospheric CO_2. Special thanks to Don Weaver for reviewing the manuscript.

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The Dellums Bill in Congress

Measures to support Climate Stabilization and SR

by Janelle Brown and Melissa Disario

Need for Legislation

In 1969, Congress recognized the seriousness of climate change and the responsibility of the Federal Government to develop domestic and foreign policies to contribute to the preservation of the environment. This led to the Global Climate Protection Act of 1987. In 1994, Congress finds that existing laws have not produced sufficient atmosphere and climate stabilization results, because human technological activity is accelerating the rate of ozone destruction, carbon dioxide buildup in the atmosphere, climate destabilization, soil depletion, and other environmental hazards.

It is the consensus of a majority of workers in the field of ecology that we now are in a period of ecological destabilization that, given the time and effort needed to stabilize atmospheric and climate conditions, constitutes an ecological emergency. Serious debate must be held on the Earth-atmosphere system producing these changes, on defining the goals to bring about climate stabilization, and on the best ways of achieving these goals.

Democratic Congressman Ronald Dellums of California has written the "Emergency Climate Stabilizaton and Earth Regeneration Act of 1994", which he plans to introduce in the next session of Congress. This bill is part of a broader effort to join the need to protect the environment with the need for full employment.

Accelerating climate extremes, reflecting the increase in atmospheric carbon dioxide during this century (approximately 280–365+ parts per million) demand an international survival program built around soil, forests, and alternative energy technology. Its task would be to consolidate the movement behind the United Nations Climate Treaty, of which the United States is a signator. This committee cannot forget for a moment the necessity of combining the social needs of people with ecological needs.

Climate stabilization can be accomplished through a program of ecosystem regeneration which reestablishes balance between atmospheric carbon dioxide and other gases which interact to influence atmospheric conditions, and by limiting the release of CFC's (chloroflurocarbons) and other compounds known or suspected to lead to ozone depletion in the atmosphere. A significant means to establish the carbon dioxide balance is large-scale soil remineralization, which supports the regeneration of planetary vegetation and significant natural carbon sinks, which remove atmospheric carbon dioxide. Additional and essential means of climate stabilization include reforestation, saving swamps and estuaries, and rapid and extensive reduction of fossil fuel consumption through conservation and development of alternative energy technology.

A significant means to establish the carbon dioxide balance is large-scale soil remineralization, which supports the regeneration of planetary vegetation and significant natural carbon sinks, which remove atmospheric carbon dioxide.

Purpose of the Act

The overall purpose of this Act is to establish a process whereby the Congress and the President of the United States shall cooperate in a national and international program to:

1) reduce heat, drought, and subsequent famine, forest fires, and tornadoes, and to decrease the freezing extremes and, snow buildup, flooding cloud cover, and winter storms.

2) promote regeneration of the Earth through reforestation, soil and ocean remineralization, conservation, and alternative energy development.

3) maximize our food and agricultural security through research on soil remineralization and other environmentally sound, sustainable means that increase the health and hardiness of crop plants and their resistance to climatic extremes and pest infestation.

4) protect animal (especially human) and plant life from the increasing UVR (ultraviolet radiation) through international cooperation in providing technology, materials, and funding.

5) assist in the creation and development of a secure, environmentally sustainable way of life that is consistent with long-term atmosphere and climate stabilization.

In order to implement the "Atmosphere and Climate Stabilization Program, the President shall, within 270 days from the date of the enactment of this Act, promulgate a regulation providing for a climatic stabilization program to be coordinated by the Council established by the President. This act will be funded by a corporate tax surcharge and carried out under the leadership of the President and a specially appointed Council on Climate Stabilization and Earth Regeneration, in coordination with state and local governments.

Please, write your congressman and senators to support this bill.

Janelle Brown and Melissa Disario attend the University of Massachusetts.

Farms, Gardens and Results

SR Pumpkin Wins Prize

The first Saturday of October each year is the big day for big pumpkins. At least the Great Pumpkin Harvest Festival in Clackamas, Oregon.

This is the time and place when the growers from Oregon, Washington and Idaho, along with over 5,000 other folks, gather to enjoy the festivities and to weigh their prize possessions. At stake are the bragging rights to the Title of Pumpkin King of the Pacific Northwest.

The winner for 1994 was Kirk Mombert of Harrisburg, Oregon.

And how big is big, you ask? Would you believe 800 1/2 pounds? Yes, 800 1/2 pounds.

That is up 73.5 pounds, or over 10%, from Kirk's 1993 winner at 727 pounds.

At the time of the Clackamas Festival, there were thirteen other Pumpkin Festivals being held across the U.S. and Canada. Besides being first in the Pacific Northwest, Kirk was 7th among the total fourteen weigh-off sites, and can claim to have grown the largest pumpkin west of the Mississippi River.

When asked what was behind his success, Kirk would only say:

A lot of hard, but fun, work,
A few guarded trade secrets, and
McKenzie Rock Flour.

Yes, **McKenzie Rock Flour**, at about 6 tons per acre.

Lee Poindexter

Don Weaver's Garden of Eden

This summer's garden is the most productive yet with steady yields of wonderful, delicious and beautiful lettuce (the Bronze Arrow from Bountiful Gardens shown in the photo was especially good with its large crowded heads averaging around 8-12 ounces), kale, pole and bush beans, arugula, mizuna, parsley, corn, etc. The Jerusalem artichoke plants are super-healthy with very thick stalks up to 12 feet and still growing well. The mineralized "out of this world" (as we know it) fruit from young plum, apple, asian pear and persimmon trees is also quickly moving toward abundance – the natural dance inspired by the Music of Life and the complete fertility born of the marriage of rock dust and compost. I'm using mostly the "Spiral Stonemeal" from Henry Bruski in Cupertino this year. Many people in this area are getting good results with it.

Don Weaver

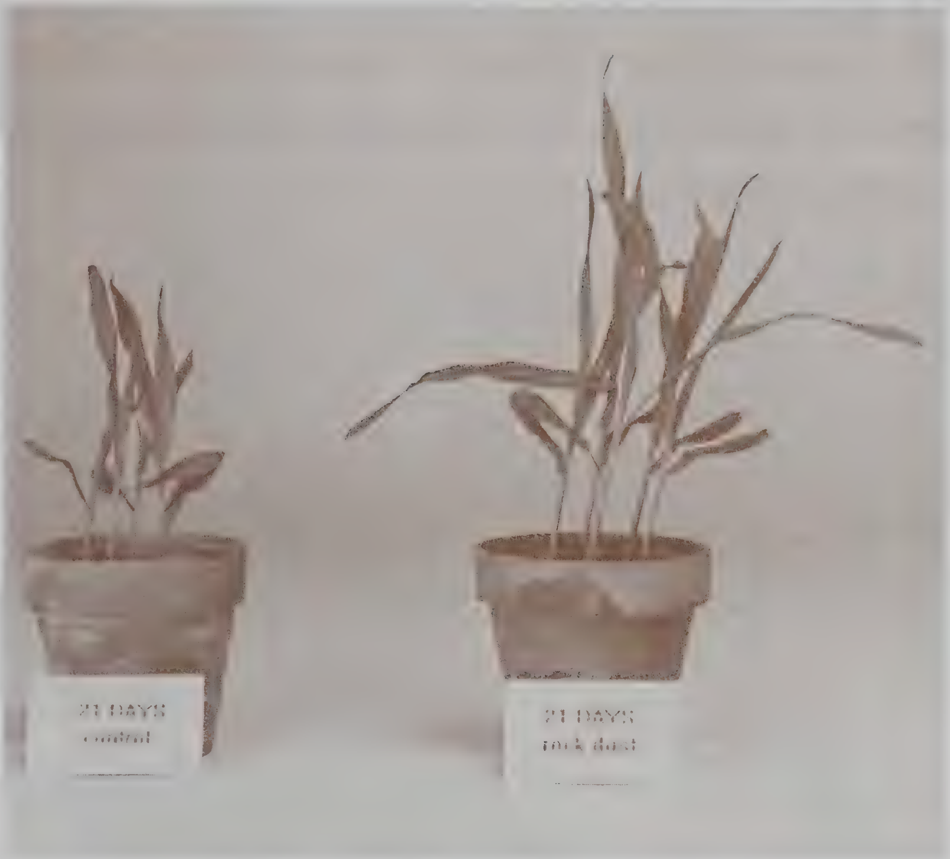
Pot Tests with Rock Dust for Corn

Dr. Bill Becker is a researcher and soil consultant for sustainable agriculture and is the Research Director of Central Illinois Agricultural Research Farms, Inc. in Springfield, Illinois.

The photo shows the results of a pot test for yellow dent corn with and without rock dust taken from a glacial outwash a gravel pit. One tablespoon of rock dust from the Illinois quarry was added to the soil/compost mixture of one of the pots before planting. Measurements taken 21 days after planting showed that the corn with the rock dust averaged more than 50% taller.

Dr. Becker writes, "This is only significant if it turns into more yield or better quality grain. I'm hoping for both."

Joanna Campe



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Featured In

"SECRETS OF THE SOIL"

Is it possible to speed up the transition time from chemical farming to organic with SR?

Ken Hahn of K-IDA-AG in American Falls, Idaho has had more than twenty years experience in the formulation of a soil revitalization product made up of naturally mined, paramagnetic minerals highly charged with energies and combined with beneficial bacteria.

Columbia Laboratories of Corbett, Oregon, an independent laboratory approved by the FDA to run agricultural tests, has reported that potatoes grown in soil treated with this product in southeastern Idaho were entirely free of toxic chemicals. Tested fields had been treated with pesticides for over 30 years and had become highly contaminated with them, and at least three pesticides had been applied to those very crops. On many farms, pesticides can be detected in produce years after their use on the fields has been discontinued. Yet when potato samples from the Idaho experiment were analyzed for some 50 pesticides, Columbia Laboratory director Steve Doane reported back that none could be detected.

> ***On many farms pesticides can be detected in produce years after their use on the fields has been discontinued.***

Farmers in the experimental Idaho project got excited over the Columbia Laboratories report. "In our potatoes, said project director George Schuchard of Chino, California, the pesticides had all disintegrated. That'a a whole new category ..."

The southeastern Idaho project involved ten farms and a cattle ranch. For the test a safe, concentrated spray, one gallon to the acre was used made out of food grade minerals. The minerals are energized by various devices, including highly charged crystals. The fertilizer spray is edible!

The method produced crops that were not only free of toxic chemicals but showed an increase in yield and higher nutritional values. The method also seemed to do a good job of controlling pests.

Hahn points out that we spend approximately ten times as much to heal ourselves as we do to feed ourselves, and that stale and unwholesome food is causing most of the medical bills in this country. He says that it was twenty years ago when he started adding bacterial products to the soil and found he could increase yield. But, it has just been in the past 2-3 years that he discovered the remarkable ability of these bacteria to break down and get rid of the chemicals in the ground with the end result of more chemically-free food.

The shift from chemical to certified organic takes a number of years with economic risks and uncertainty for the farmer that can make farmers reluctant to shift to organic. And merely switching to organic farming doesn't solve the problem of chemicals and pesticides residues of past chemical farming in the soil.

The results from this test are quite an achievement and point to the tremendous potential that soil remineralization has for bioremediation of chemically farmed soils and is an important consideration for rock dust soil amendments as more chemical farmers transition to sustainable agriculture. We are referring to a sophisticated blended product, but the results of this particular product suggest similar results with this type of testing could enhance a rock dust's value and marketability.

Joanna Campe

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For a 2,000/sq. ft. garden $100 +S&H ($10.00 UPS)

Kenneth Hahn
2540 Smith Road
American Falls, ID 83211
(208) 226-5884
1-800-727-5884
(outside Idaho)

Corn grown with *Biological Farming* Methods

by Leland Taylor

"Except for other biologically farmed corn, there simply wasn't any near Waterloo, Iowa which compared with this," shows Herb Ide. Lengthy and heavy spring and early summer rains, then extremely hot and dry weather damaged conventionally fertilized crops a well as those heavily manured. Complete soil mineralization (Biological Farming), has been demonstrating such startling improvements over conventional fertilization ever since Dale Heath, Shelby, Montana spread 100 tons of Clod Buster (geologically concent- rated humus mined as carbonaceous shale) off his chemically sterilized, but highly mineralized soils, in 1966.

Heath's wheat protein had dropped from 17 percent to 8 percent; quickly returned to the 17 percent level once he stopped using ag chemicals of a kind and completed "suitable soil environments for the spontaneous occupation by beneficial organisms. Those beneficials proliferated and produced truly fertile, truly productive soils."

Herb Ide's amazing corn

Few U.S. soils ever contained the high mineral levels of the Heath soils; most are sadly deficient in minerals but continue getting only nitrogen, phosphorus, potash and lime – thus omitting eleven of the essential plant foods. Lime generally also contains magnesium, also essential. Foods, feeds and forages produced on such deficient soils can be nothing but a heavy contributor to the fact that U.S. health costs are the highest of any civilized country.

Foods, feeds and forages produced on such deficient soils can be nothing but a heavy contributor to the fact that U.S. health costs are the highest of any civilized country.

Herb Ide of Waterloo, Iowa shows where the co-op ran out of the fertilizer, Fertimax which consists of pulverized carbonaceous shale into which whatever essential nutrient is missing or in short supply is blended for each specific soil.

Lengthy and heavy rains had leached the nitrogen put into the soil by a crop of soybeans the preceding year, but wherever the humus-based, mineralized blend was spread, multiplied biotic activity supplied ample nitrogen to the 175-bushel corn crop.

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Kaui Organic Farms

By Joanna Campe

Ray Maki and Neal Norman have recently formed a new partnership by merging their farms to become Kauai Organic Farms. Both farmers have utilized soil remineralization and will continue to do so.

Two different varieties of ornamental palms

Hanalei Palm Ranch

Neal started the Hanalei Palm Ranch in 1987and he is the only person he's aware of in Hawaii who grows ornamental plants and trees using organic methods. He has the kind of diversity that calls permaculture to mind with over 50 varieties of palm trees, bromeliads, and tropical flowers. He has aquaculture with tilapia, toucanary bass and many varieties of fruit: bananas, papayas, egg fruit, starfruit, lychees, mango, mangestine, a lot of citrus and coconut palms and more.

Although Neal grows mostly ornamentals, he is moving over into food crops, culinary and medicinal herbs such as ginger and turmeric, and now crops such as lettuce, the brassicas, roots such as carrots and beets, and peppers and tomatoes in greenhouses.

Papaya grove at the Hanalei Palm Ranch

Neal discovered SR about the same time he began Hanalei Palm Ranch. He was also involved in real estate of agricultural lands for many of the organic farms. He started testing soils. The USDA Soil Extension Service doesn't mention rock dust, though they do recommend lime from crushed coral. A man with a trucking company recommended the local bluestone (a volcanic basalt) for root growth. Neal started using it and found it a great and inexpensive source of growth.

His answer to disease is a good, well-fed healthy tree. For a good nitrogen source he mixes composted manure, compost, peat moss, wood chips and crushed coral as a source of lime.

He adds 2 tons/acre of crushed coral and 3-4 tons/acre of bluestone rock dust in the food gardens. Every time he rotates a crop, he then sprinkles in smaller amounts. As I arrived, so did a fifteen ton order of bluestone.

When he's about to plant a large tree, Neal digs a large hole and adds a good base of soil mixed with rock dust – ten pounds for a large tree. For a baby tree with a 36-inch hole he adds about four pounds of rock dust. He mixes it in the base, puts compost and rock dust around the edges and top dresses every three to four months. He refers to it as "making a birthday cake". Clay soils are tough and he says "give it a great start and you don't have to worry about growth." With vegetables and fruits he gets fast growth and produce that is healthy and sweet.

Kaululena Organic Farms

Ray Maki owns Kaululena Organic Farms, which he started in June 1994 with row crops for market. He loves networking and connecting farms in agriculture in Kauai, accessing U.S. markets and technology and adapting to a tropical environment, with the advantage of four seasons.

The U.S. Mainland will have a tropical organic supply from Hawaii and he envisions using it as a springboard to unite and work with the Pacific islands, where there is much potential for the development of organic agriculture. He sees Hawaii as the engine of the Central Pacific with it's geographic location and U.S. infrastructure with a lot of still open and usable land. When the sugar industry goes there will be a great potential for diversified agriculture.

Ray says he wraps everything agriculturally around permaculture and SR, from the smallest plant to the biggest tree. In conventional farming methods, soil is nothing more than a medium for chemicals – there is no concern for soil structure, while modern agriculture is basically hydroponic.

Ray first ran into literature on SR from the Earth Regeneration Society and Institute for a Future, while living in Berkeley and saw the film *Stopping the Coming Ice Age* and just thought it all made sense.

He had read about it before that in a recipe for growing sprouts and wheatgrass with perfect soil conditions from Viktor Kulvinskas. He then became associated with Cell Tech and felt "amazed by the effect of blue green algae on his body and health". So he came to SR also via nutrition. Raw foods make up about 50% of his diet and he says that "eating food you produce is source of satisfaction."

He did a lot of networking of SR, but didn't begin large scale gardening until 1994 in Hawaii, for which he had prepared a long time. In Kauai he has grown a lot of herbs, culinary and medicinal, with emphasis on Ayurvedic and Chinese medicinal herbs.

As a "mainlander" he realizes the importance of the sovereignty movement in Hawaii as it moves forward and in the direction of eventual reunification of the Polynesian islands and loves consolidating resources, talents and helping to expand networks. Ray is implementing this vision on his own land, and wishes to merge that vision with the greater Pacific vision.

Neal Norman and Ray Maki overlooking seedlings in the greenhouse

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Gaien Garden

Sustainable market gardening with SR

By Joanna Campe

A Bio-intensive Mini-farm

On a visit to Kauai four years ago I interviewed George Hadley at his organic farm in the mountains near Kapaa. He began with virtually dead dirt, and within a year had begun the transformation from "dirt" which had been used and abused for industrial growing of pineapples to fertile soil remineralized with blue stone, the basalt rock of the island.

> ***Gaien Garden is a bio-intensive mini-farm, 15,000 square feet of hand-cultivated beds producing over 4000 pounds of saleable greens per month – even growing such cold-hardy vegetables as spinach, kale and beets in the tropics.***

Four years later the transformation is complete. He has learned from many fine farmer/teachers such as Hugh Lovel, Bob Cannasara, Eliot Coleman and David Katz.

George, now going by the name "Sun" farms with clean culture methods, i.e., not using any animal products in building soil fertility.

Gaien Garden is a bio-intensive mini-farm, 15,000 square feet of hand-cultivated beds producing over 4000 pounds of saleable greens per month – growing such cold-hardy vegetables as spinach, kale and beets, even in the tropics.

Sun says you need to "create a banquet in the soil". He grows over forty varieties of salad and greens. What makes this possible is the work of "many hands"– there are three part-time apprentices for the garden – with a strong focus on community. Sun envisions such a community as a wonderful way to get together and "share differences".

A major focus of the garden is open pollinated seed, and interplanting à la John Jeavons is critical. Without soil shade you're out of business. You need a living mulch, and Sun interplants with arugula and mizuna to shade the soil. He composts with grass which grows around the plots and is kept short and trimmed.

Nematodes in Hawaii have been a major deterrent to plant health and quality. Sun uses an enzyme with the trademark name Farewell that chews on chiton, the skeleton of the nematode.

Microbiology, he says, is the answer. And what do you feed microbes? Rock dust! Add a little compost and there's a major bloom. It's the same with rock dust. He also recommends soil testing, composting and cover cropping.

At the University of Hawaii there is a lot of research with chemicals to fight nematodes through unsustainable methods and work with herbicides and pesticides. With enzymes like Farewell there are ecologically and economically sustainable alternatives that are even more effective. Sun says the USDA looks at "what you can throw on a crop", but we need to look fifteen years down the road.

Not all rocks are the same and Sun recommends testing with an Erg meter. Erg is the energy released per gram of substance. The meter and the product Farewell are available from Peaceful Valley Farm Supply (see *Gravel Source* list). The meter

Climate Change and CSAs

Sun has observed that in Kauai in the last few years winds have quadrupled and it's dryer. He says Hamaker is right about climate change, and we need to come together in community supported agriculture everywhere and stop buying our food at the store.

Athena in the Gaien Garden

Athena is a 20- year old apprentice at Gaien Garden since June, 1994. She has become interested in gardening in community.

Athena became aware of her dependency on health food stores for clean food, and wanted to be more independent in taking care of herself. So she began volunteering at the farm (she lives in a yurt nearby) and then became an apprentice. She has been able to remove herself from the complexity of modern day society and is able to focus inwardly on the garden. In nine months she feels she can manage the garden with Sun's advice. Now she can make precise judgement calls for what the vegetables need.

can measure soils, rock dust, compost, foliar and drench sprays such as compost tea, etc. Sun's compost pile has an extremely high Erg meter reading. He feels it is the perfect test indicator for soil conditions, a high, excellent reading being in the range of 600-900 ERG for soil. Sun says that with a healthy reading you are assured that you will grow healthy crops.

For Sun, rock equals original soil. He sees a great connection between sugar craving and demineralized vegetables. Why are people addicted to sugar? The brain needs to function, and without minerals in vegetables, there's a craving for sugar. A "brix" reading is a test which gives the sugar content of vegetables; a high brix reading correlates to mineral content. High plant sugar equals high mineral content equals no pest problems as well. Eating remineralized vegetables means no unhealthy and unbalancing sugar cravings, and the brain and body get the minerals they need to be in healthy balance.

Gaien Garden sells vegetables on Wednesday afternoons at the Farmer's Market in Kapaa, and Saturday mornings at the market in Kilhuea. Whenever I have the opportunity to eat remineralized vegetables I am truly amazed by their enhanced flavor and substance. My family and I ate many of the 40 varieties of salad, greens and herbs daily while we were in Hawaii and found their flavor and quality incomparable.

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SR Everywhere...

SR and 'Designer Wastes'

Dr. Ron Korcak of the USDA, in a recent paper to the Society for Mining, Metallurgy, and Exploration, Inc. wrote about the concept of 'designer wastes'. He writes that the utilization of any by-product for sustainable agricultural systems has to be evaluated on the basis of protection to the environment and the food chain as well as economically. Sustainable agriculture systems are aimed at reducing inputs, maintaining productivity, and preserving the dynamic biology of the soil.

One mechanism to incorporate industrial by-products into sustainable systems would be to establish recycling/mixing centers. Many by-products emanate from/or near the urban-rural interface around metropolitan areas. These centers would not merely act as collections sites but rather a facility where materials would be mixed and blended and/or composted to fulfill a prescribed need, hence the term 'designer wastes.'

To some extent this concept is already taking place in the processing of sewage sludges with alkaline inorganic by-products to produce an artificial soil.

Other types of 'designer products' could incorporate mineral fines to overcome known trace element deficiencies, or to produce potting mixtures for the bedding and containerized plant nurseries and landscape industries, when blended with composted organic materials such as yard wastes, newspaper, or sewage sludges.

Another use of blended industrial by-products with organic composts would be in the bio-remediation of metal contaminated soils.

Model systems of blended materials should be evaluated and field tested with industry as a cooperator. The most practical way to accomplish this is to apply what we know about the soil/plant system, make a sound analysis of the feasibility of utilization, identify potential end users, and then gather the necessary data to show the benefit to be gained.

(Condensed from *Products Utilization in Agriculture: Past Experiences and Potentials for the Future,* Ron Korcak, USDA/ARS, Beltsville, MD for SME meeting in Denver, CO, March 6-9, 1995.)

Basalt Rock Dust Milk for Peach Brown Rot

The Organic Farming Research Foundation (OFRF) gave a grant to Carl Rosato of Woodleaf Farm in Oroville, CA to do research on the Control of Peach Brown Rot. The study began in 1992 and continues. Research is being focused on Algrow kelp and basalt rock dust milk.

Conclusions: Following the first few seasons of on-farm research at Woodleaf Farm, the investigators determined that the most successful test substances function to control *Monilinia* in different ways. Pink mucoid yeast competes directly with brown rot, while Algrow kelp and basalt rock dust milk enhance the health of the trees and promote the growth of pink mucoid yeast.

Field observations at Woodleaf Farms showed the most promising results from basalt rock dust and Algrow Kelp. The test sites where these materials were sprayed in combination had the least amount of brown rot damage and produced the highest yields. An added advantage of this mix is its ease in mixing and application – a simpler process than working with a microorganisms like *A. pullulans.* In 1995 Carl will continue to test basalt rock dust milk in conjunction with Algrow Kelp.

(*OFRF Information Bulletin*, Winter 1995, Number 1,P.O. Box 440, Santa Cruz, CA 95061)

Slippery Rock University Trials SR and Compost

Dr. Thomas H. DeLuca and **Dr. Larry Patricks** of Slippery Rock University in Pennsylvania have received a grant for a an 8-acre composting facility designed to handle food waste, yard waste, brush and other miscellaneous cellulosic wastes generated by the Borough of Slippery Rock and Slippery Rock University. In addition to compost processing and research, this facility would provide demonstration gardens, a gathering place, and hands-on composting opportunities for the community. Research efforts would focus on optimal mechanical procedures for composting food wastes, the efficacy of various inoculants, effects of natural mineral additives on compost vitality, and links between composting and the community.

As stated, one much needed and exciting aspect of the research is remineralization of composts with rock dusts. The process of adding rock dusts will introduce trace elements to the compost, act as a buffer and stabilize temperature fluctuations. They will be monitoring for conclusive evidence of the efficacy of the use of rock dusts in compost systems to create a complete fertilizer out of compost.

SR Research Proposal for MA

Alex MacPhail of EarthArts Institute and Joanna Campe of ***RE*** applied for an Agro-Environmental Technology Grant from the MA Department of Food and Agriculture with matching grants from NER/

SARE and OFRF for *Soil Remineralization for an Economically and Ecologically Sustainable Agriculture in the Pioneer Valley*. The proposal was to do research and to promote SR as a new technology to farmers in Massachusetts. The grant did not go through the DFA this year but was passed by the DFA to a state agriculture foundation which is giving it serious consideration.

SR Trials for Coal Mine Disturbed Land Reclamation in South Wales

Dr. Martin J. Haigh of Oxford Brookes University in England is doing research on the reclamation of coal mining lands in the UK and Bulgaria. There are sites where the reclamation of coal mine disturbed lands has not been successful, even after 50 years, and this is a great challenge. While the approach of many scientists currently is to inoculate the soils with microbiological cultures or earthworms, the approach of Haigh and two Bulgarian scientists is forest biological recultivation. Forestation with deep-rooting tree species begins the process of re-establishing the biological factors of natural soil formation. The team has been exploring the application of this strategy at sites in Bulgaria and in Wales.

Dr. Haigh is also beginning trials using this method in conjunction with SR to see if this contributes to the overall growth of the trees and rebuilding biodiversity in the soil. For readers who are soil consultants or scientists, ecologists or other, and would like to make suggestions or follow the project, you can contact Dr. Martin J. Haigh, Geography Unit (S.S.), Oxford Brookes University, Oxford OX3 08P, England.

SR and Shale in Scotland

Dr. Iain Allison of the Department of Geology at the University of Glasgow saw the article on the USDA conference in Beltsville, Maryland in ***Episodes*** 17, No. 3. ***Episodes*** is the international magazine for IUGS, The International Union of Geophysical Sciences and is published in England.

Dr. Allison writes they are conducting experiments using ground adularia shale with soil micro-organisms to assess the leaching of K from the silicate minerals. He reports there was also an article in the recent HDRA News magazine and-writes that SR is catching on there.

Sustainable Agriculture SR Project in Belize

Eckhart Stoyke, Director of the REAP Society (Restorative Ecological Agriculture Project) has received a $3,000 grant for the exploratory phase of a sustainable agriculture project in Belize. The main thrust will be the exploration for a local source of rock dust, hopefully from volcanic deposits such as are available in neighbouring Guatemala. The encouraging results with rock dust for banana growing in Australia would bode well for the fruit growers in Belize.

The REAP Society would like to hear from like-minded people in Belize who may have an interest in getting an agricultural co-op started that would look at seed production, introduction of the winged bean, native to New Guinea, a vegetable with multiple uses (the seeds, tubers, and leaves are edible, protein content of the tubers is four times higher than that of potatoes); also iguana farming and similar initiatives that can be combined with tree farming and the application of rock dust.

The increased interest in eco-tourism is already straining the resources of this undercapitalized nation with tourists starting to outnumber the population. Sewage treatment therefore becomes a problem. Sewage treatment by means of treated quartz powder which induces aerobic fermentation without the need for energy intensive air injection, could provide an intermediate step to water purification by means of aquatic plants and fish farming. Aerobic fermentation binds ammonia in a plant-available non-leachable form. Peter Theodore, who is on the project staff of the REAP Society, is establishing contacts to set up a network of supporters for this initiative.

Anybody who has knowledge in one of the areas mentioned and can provide input or a donation for this non-profit initiative may contact the REAP Society at Box 30, Site 4, RR#1, St Albert, Alberta, T8N, 1M8 Canada Tel. 403-460-9304, Fax. 403-439-2479.

Creating Community Sustainability Across America 1994

This year one of the plenary speakers was **Greg Watson**, former Commissioner of Food and Agriculture for Massachusetts and a long time admirer of the work of John Hamaker and an advocate of SR. Every year at the above conference in Washington, D.C. for the last three years, Joanna Campe was part of a panel on sustainable agriculture and gave a presentation on SR.

Dr. Ron Korcak, who is monitoring SR trials at the USDA in Beltsville took part in a panel on Waste Management and Water. He spoke on the use of industrial by-products as a component of organ-

Farewell to Three SR Products

BioPlus, a product available through **Rod Lertola** of Meridian Environmental Group seems to be no longer available. Rod Lertola was a pioneer of SR products. A friend and co-worker of John Hamaker, he brought out a product in the 1970s. Bioplus was his second attempt to market a product.

Meganne Easling has discontinued Nutri-stone in Ojai, CA. She was only able to get the product in 24 ton shipments and not able to continue storing it. She continues networking SR.

Pacific Rim Soil Additives Unlimited of **Fred Pancratz** in Fairbanks, Alaska was sold to a Korean company which now sends the glacier material to Korea for agriculture and does not distribute in the U.S.

New SR Products

Vulcan Minerals has come out with bags of combinations of rock dust for SR, available now, as yet, no trade name, but ask for Mineral Earth. **Don Powell** is the person to contact.

Omar Migdadi is introducing Min Plus USA in liquid form to U.S. markets, and it is already approved in many states.

Mariah International, a gold mine in Arizona has also developed a product in liquid form called Replace. Not available yet, but should be soon. **Bill Pierson** and **Dick Cambell** are the main contacts persons.

Peak Minerals has moved its headquarters from Colorado to Branson, Missouri, a small town in the Ozarks amidst clear lakes. A study was recently completed with chickens given Azomite to supplement their feed. The researcher reported a doubling of the immune system response.

Find info on the above companies in the *Gravel Source* section and ads.

ic-based amendments which may be advantageous in sustainable systems, and the need to quantify the potential benefits.

Another plenary speaker, **Dr. Raymond Obomsawin** of the Oneida Nation in upstate New York, gave a keynote slide presentation, *Re-Discovereng Our Roots: The Ancient Wisdom of Sustainable Societies* on the theme of what Native American peoples and cultures have to contribute to our vision and practice of sustainability in all fields. In his speech he advocated remineralization as coming from a background of clean-culture agriculture advocated by Sampson Morgan, Albert Carter Savage and others. Dr. Obomsawin has a doctorate focused on Health Science and Human Ecology. Dr. Obomsawin and Joanna Campe are collaborating on a slide presentation on SR that can be made available to other SR networkers for presentations and networking.

The yearly conference is sponsored by Community Sustainability Resource Institute, and is a great resource for those involved in community sustainabililty. For more information: CSRI, P.O. Box 11343, Takoma Park, MD 20913, 301-588-7227 Fax 301-587-7691.

A Call for An Alternative Technology Foundation for SR

Rationale for such a foundation:

Individually, small and medium size companies cannot afford to compete with large, well established organizations in research and development or full-scale marketing efforts. To a great degree, the owners/entrepreneurs (with their small staff sizes) are researchers and technicians who find it difficult to divide their time between their labs and the world of public relations, grant-writing, creating marketing strategies, keeping up with evolving government regulations, etc.

Collectively, by creating an "Alternative Technology Foundation," a technological/ marketing co-op can be created presenting both small existing and start-up companies with real, competitive "buying power," thus bringing greater parity between their costs and those of the giants.

Perhaps, most importantly, the foundation can identify and help secure partnerships between large organizations and the entrepreneurs, who not only have a need to employ new technologies, but who also already have in place distribution networks for goods and services.

In short, the foundation can deliver big company services to undercapitalized scientists.

To support such an effort contact: Clancy Eldredge, E.F. Environmental, P.O. Box 349, Grosse Ile, MI 48138, Tel: 313-675-2250, Fax 313-675-2271.

Special SR Network Mentions

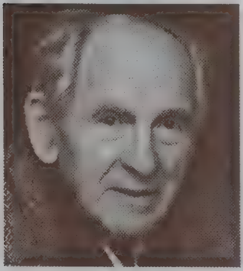
James E Carroll, PhD of Johnson City, Tennessee, has been lecturing on SR and it's relationship to our health and total well being and reaching farmers in his area. He has been contacted over many years through the Network List and given much advice on SR.

Jarrett Buys of Clearwater, Florida is forming a non-profit called Safeguard Earth's Environment Foundation, Inc., whose purpose is to prioritize environmental issues and direct others to solutions that will improve key problems, as well as advocating SR, and finding technological solutions to climate control is a priority.

Rex Oberhelman in 1987 was named a "Safe Food Trailblazer" by Americans for Safe Food, a Washington D.C. based organization. He is a Minnesota farmer who turned the bankruptcy of his conventional 120-acre farm (with 5 acres to begin over again) into a thriving network of over 50 farms supplying pesticide-free food to dozens of retail stores and restaurants in five states. He has also become an advocate for SR.

See network list to contact them.

Farewell to Leopold Kohr 1909-1994



Leopold Kohr, a dear friend and mentor, has passed away this year, and I would like to acknowledge him here. He was the original 'small is beautiful' economic philosopher and a teacher of Fritz Schumacher who popularized the idea. He was the author of *The Breakdown of Nations* and many other germinal books.

He championed SR and invited me to speak for the first time at a conference, *The Future In Our Hands* in Ireland, and then at the Fourth World Conference in Zurich and to many other conferences and events in Europe. I was privileged to honor him at Yale University in a remembrance as part of the Schumacher lectures last fall.

He brought incredible warmth and sparkling wit to his philosophy and life work and to his friendships, bringing an extraordinary and always treasured richness to my life.

Joanna Campe

And to Dr. Gernot Graefe

Dr. Graefe, whose studies on SR appear in the Agricultural Research Packet available through ***RE*** also died this year. I have no details, but will also miss this great man. He and Dr. Maria Felsenreich have promoted SR in Austria and the german speaking countries, and were most recently engaged in homeopathic treatments for forests, rivers and whole ecosystems with rock dust.

I first met him at an Earth Regeneration Society Conference that took place in Philadelphia, and then later at another gathering, a seminar at the International General Systems Research Conference in Budapest, Hungary. He developed Biovin, a highly organic and fertile compost from vineyards and combined it with rock dust to make an ideal product for soil fertilization. He was a member of the Austrian Academy of Sciences and often worked as a scientist for the Austrian government. He dedicated the last years with Maria Felsenreich to restoring Earth ecosystems on a large scale with soil remineralization using homeopathy. (JC)

Dr. Graefe, Betsan Coats and Dr. Maria Felsenreich at a conference in Budapest in 1987

Betsan Coats and The Snowballing Plea

by Tracy Bliss and Krystin MacAlpine

Betsan Coats of the Snowballing Plea is stressing the great importance of SR for reafforestation. It greatly increases the success of the enterprise, and ancient forests whose soil is impoverished or poisoned by pollution and acid rain recover when rock-duct is sprayed on them.

Sri Sunil K Roy, consultant for the UN Environment Program and member of the National Committee for Environmental Planning says "So much of the current development... is undermining the environmentally sound approaches of people who have survived many millennia in the current conditions. Their variety is a reflection of the earth's biological diversity which we continue to devastate at our peril."

In Tamil Nadu in southern India, the Madurai Kamaraj University has created its own productive environment situated about thirty miles from the ancient city of Madurai, where there is now a perpetual drought due to the clearing of the forests. When the university took over the grounds about 30 years ago, there was not a single tree on the site. Now, after SR with rock-dust, it is an area of the most marvelous plantations, avenues, gardens, a botanical garden and special experimental areas.

There are many simple well-proven methods of ameliorating the lot of the very poor which only require modest financing to be effective on a wide scale. The Hand and the Glove, a pamphlet distributed by the Snowballing Plea to Save the World Environment, proposes that unemployed people should be given the option of doing such vital creative work as remineralizing soils and planting trees and seeing the transformation they bring to a scene in a a very short time. Such workers need to be brought together on a voluntary basis on a world scale. The cost of providing this alternative to unemployment will benefit the land, the people, and be an investment in the future.

Rock-dust is the simplest, cheapest, and the most universal form of fertilization. It can easily be made available to the Third World where in some places it is already being used successfully. There has to be a commitment to the conservation and improvement of the environment on which we are crucially dependent. For Coats, restoring fertility through thoughtful and practical Soil remineralization is the number one priority for saving the Earth and the Human Family.

The Snowballing Plea, PO Box 77, Cotton Tree, Qld., Australia 4558.

Tracy Bliss and Krystin MaAlpine are students of the University of Massachusetts.

Hope L.A. Project: Planting the Seeds of Hope

by Anna Bond

For a little over a year now Cell Tech, the network marketing company that harvests and sells Super Blue Green Algae™, has been providing algae to 30 gang kids in South Central L.A., the war zone of last summer's riots. Recognizing youth as our most valuable resource, Mike Stewart and George Singleton are dedicating their time and energy to direct this project, which may well become a working model other cities can adopt. These youth, aged 14 to 22, who choose to remain gang and drug-free are also being taught organic gardening and urban reforestation as well as pride, self worth, heritage and empowerment.

Working with the U.S. Forestry Service, members of the L.A. Project are planting the Chinese hardwood *Paulownia*, an extremely fast-growing, tissue-cultured tree that shoots up 80 feet in five years.

Of course, the topsoil in South Central L.A. is extremely poor. To remedy this situation, Cell Tech is also providing a soil amendment formulated from fresh blue green algae, pumice from Mt. Shasta (which absorbs the moisture from the algae thus obviating the expensive lyophilization process), and a broad-based volcanic rock dust from Crater Lake. This soil amendment, inspired by John Hamaker's remineralization work outlined in *The Survival of Civilization,* has already transformed the compacted and poisoned topsoil so that it is producing vibrant fruits, vegetables, flowers and trees.

A second Blue Green Algae™ byproduct designed to nourish plants is a foliar feed made from Blue Green Algae™ dust and quartz crystal dust. This very powerful foliar feed is modeled after the Rudolf Steiner's biodynamic preparation 501.

The Project has a 2-acre plot in the "hood," a non-truce gang area where drive-by shootings occur almost daily. Despite nightly vandalism and sabotage, the inner city youth involved in this project are full of good spirit and hope. They see a carrot growing from a tiny seed. They witness their own attitudes changing, their ability to focus and concentrate in school growing, and their commitment to the soil, the earth and the community return many fold.

Agri-foresting with its core of gardening is approached as a medium to teach control, discipline, forbearance, will and timing. Class topics include, among others, gardening, orcharding and agri-forestry; natural versus chemical techniques; recycling and composting; transformation of communities through gardening and agri-foresting; the function and power of seeds; plant and human sexual reproduction; respect for women; pesticides and children; Charles Darwin and the earthworm humus controversy; food preservation; climate control and the greenhouse; history and pre-history.

The transformation project of South Central L.A. is appealing to individuals, churches, corporations, and community groups to support this grassroots project goal to reduce violent crime, to achieve racial unity. and to generate significant community economic wealth, including 180 stipend training positions for gang youth and youth at risk through 1997;also projected are 200,000 tree plantings on 1,000 acres; $60 million in export valued timber; $60 million in wood manufacturing and retail commerce; and 3,600 new jobs created throughout South Central by the year 2003. Each tree/purchase/sponsorship provides 1 hour of horticultural training for a gang youth or youth at risk, and 1 hour of stipend pay at $5.00 an hour to that same youth.

Hope L.A. Horticultural Corp Director George Singleton tells the class the correct way to pull weeds inside their two-acre garden.

In June of 1994 Super Blue Green Algae™ was approved for distribution to 130 Gang-Bangers too young to deserve prison. This landmark decision marks the first time a food has been approved for use to supplement the diet in a prison context.

A 15-year-old Hispanic Project member currently taking 5 grams of the algae a day wrote the following testimony: " The [algae] makes me feel great. Since I started taking it, I get a better night's sleep. When I wake up in the morning, I feel refreshed. My body feels more energetic. I don't get sick as often as I used to. Also I can concentrate more on things. I'm able to think more clearly. That's helped me out a lot in school. It really makes me feel good about myself." (She raised her grades from D's and C's to A's and B's in one year, and her school attendance was more consistent. She has begun creative writing and poetry in both Spanish and English.)

For more info, to purchase / sponsor a Paulownia tree or to give donations to the Hope L.A. Project, please write Michael Stewart, 208 Via Nada, San Clemente, CA 92672.

Remineralize the Earth

Candidate for National Award for Environmental Excellence

Remineralize the Earth has been selected for inclusion in the ***Environmental Success Index***, a database that communities can use to learn about successful environmental programs. The Index contains information about 1,600 outstanding environmental programs from around the country which provides replicable example of effective environmental solutions. This unique directory is used by government agencies, companies, environmental organizations and civic groups to learn how to implement similar programs in their communities.

Remineralize the Earth was also selected as a 1994 candidate for Renew America's Fifth Annual National Awards for Environmental Sustainability. It was selected through a vigorous verification process which included community references, review by state and local experts, and a careful screening process for our National Awards Council for Environmental Sustainability.

Renew America, the nation's leading source for environmental solutions, coordinates these annual awards. The winners are selected by the National Awards Council for Environmental Sustainability, a unique coalition of 60 environmental, community, government, and business organizations.

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The Enlivened Rock Powders

by Harvey Lisle

Dusts of the Soil

"Life's tenuous connection to the cosmos is a concept almost all literate people think they understand. And yet the principles that enliven the engine of photosynthesis remain as elusive as our perceived comprehension of nature's tap into the Sun. Standing on the shoulders of giants – Rudoph Steiner, Julieus Hensel, von Welmont, Phil Callahan, and dozens more – Harvey Lisle has captured for us both the physical and the spiritual connection that links rock powders – specifically enlivened rock powders – to life, to agriculture, to cell and plant development. By taking crop production away from single-factor analysis, Harvey Lisle has performed on par with he great innovators and has caused us all to consider anew the sacred text: dust thou art, and into dust thou shall return."

Charles Walters

Chapters......

1. Rudolph Steiner, the Seer 2. The Birth of the Planet 3. Crystal Power, Rock Powder, Living Power, Spiritual Power 4. The Silica Rock Powders 5. The Lime Rock Powders 6. The Clay Rock Powders 7. The Zeolite Rock Powders 8. Enlivening and Balancing the Soil 9. Sustainable Agriculture 10. Soil Structure, Drought, Cold, Insect and Disease Resistance 11. Enzymes, Vitamins, Minerals and Sunshine 12. Bread From Stones 13. Ancient Wisdom Transformed 14. Radionic Amplification of Paramagnetic Forces 15. Neutralizing Noxious Forces 16. Biodynamic Forces 17. Dowsing 18. Grammar of the Subject

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Earth Regeneration Center in Scotland

Cameron and Moira Thomson

In Scotland there are now more than 1/4 million people receiving state benefits for doing nothing – they are "surplus to requirements". We have an increasing acreage of set-aside land – "surplus to requirements." The coordination of remineralization in Scotland could alleviate these problems, with government cooperation and support, eventually returning qualified Earth Regenerators to over a million acres of set-aside land.

The Earth Regeneration Centre has improved continuously every year for the five and a half years since we moved here. As a small prototype for climate shift gardening, it has earned the remineralisation and permaculture "theories" the practical proof required to convince interested parties of its astounding results. Our one-fifth/acre garden is lush, yielding brussels sprouts as large as kiwi fruits; three-and-a-half pound cauliflowers, lettuces as large as a man's head, 11 lb. cabbages; black currants the size of small grapes, gooseberries as big as plums...and all unblemished and with dynamic flavour.

The minerals and trace elements in the rock dust/stone flour are a food source for soil microorganisms and worms. A soil population explosion is a food source for plant, insect and bird life. Birds and little creatures take refuge in such a habitat and do not touch our food because there are plenty of pests for them to eat – keeping slug, insect and bird damage to a remarkable minimum.

Eventually, in the one to two years it takes to establish permaculture, there are enough worms to do the digging for you! The garden, or field, becomes a self-regulating ecosystem tended by thoughtful human interdependence, giving the permaculture gardener or farmer more time and energy for tending the crops and the natural environment he has regenerated.

Beetroot harvest and leeks – plum tree to the left.

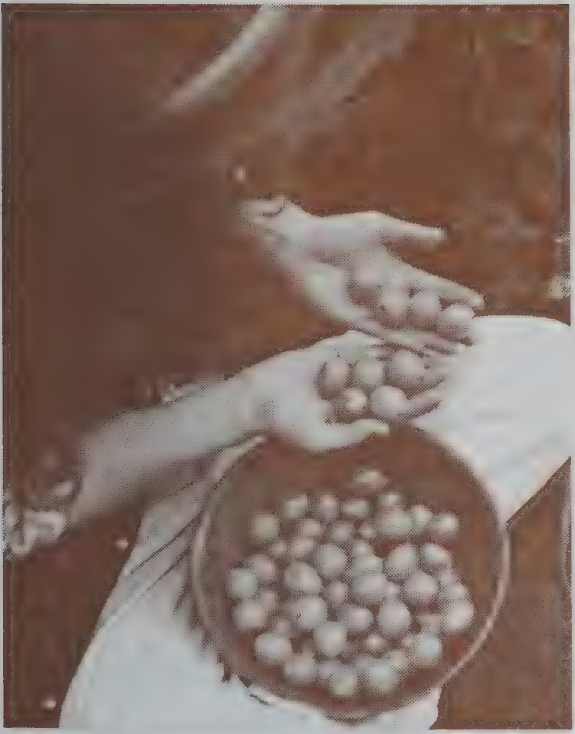
There is a market for this kind of environmentally friendly, non-exploitative food production; a remineralisation/permaculture "teaching scheme," a *Scottish Earth Regeneration Newsletter,* and a "Rock Dust Distribution Service. Individuals, groups of gardeners, groups of students, families and unemployed people with a will to work and learn come to see our abundant garden and our frugal attempt to live as self-sufficiently as unemployed people can. We receive letters from near and far requesting information, advice, tuition, and offering to become involved in our work.

Our ability to respond to all requests is diminished by our poverty, lack of facilities and space to accommodate help, and the lack of land to produce the remineralised food which is in demand – incorporating a teaching scheme and Community Supported Agriculture.

Dr. Douglas Craig of Dundee, a homeopath for 60 years, along with

To support the ***Earth Regeneration Centre:***

Cameron and Moira Thomson
Cottage 3, Scotston Farm
Auchterhouse, Dundee
Scotland



Garden variety gooseberries as large as plums

Lady Eve Balfour co-founded the Soil Association. He is inspired by the work we are committed to, the results, and the recognition our Earth Regeneration Centre is receiving. He has offered to pay for rental of an acre or two to enable us to start from the beginning, on a bigger scale, with volunteer students and subscribers who would buy the produce when it becomes available.

Dr. Craig said 100 of his patients would be keen to subscribe, and we have also a growing list of people in Tayside who are ready and waiting to be able to buy this kind of food.

We would like to establish a nonprofit organisation. It would facilitate voluntary training schemes (unemployed people are given £10 per week on top of their state benefit to do voluntary work for organisations and Trusts), teaching work, rock dust distribution and related work, building work, gardening work, food gathering and distribution, as well as enhancing the condition of our environment and our climate.

Scottish Earth Regeneration (SERTS)

Among the aims of the scheme are to offer tuition and an educational career to unemployed people with an interest in gardening and ecological alternatives, to utilize the diverse potential of set-aside land, and to combine unemployment and regeneration to create a budding ecological industry and an abundance of clean, healthy food.

The SERTS program would draw students from among unemployed volunteers, university or college students and anyone else who wishes to learn about SR and regeneration. SERTS would be open to members of the public, subscribers, school visits, visits from societies, organisations and supporters, farmers, doctors, etc. Specialization would last one to two years.

The educational content of SERTS would include: techniques for remineralising and nourishing the soil; growing abundant fruit and vegetables around young trees without digging or ploughing, after initial ploughing in of rock dust is completed; minimizing weeds; cleansing soil of chemical and radioactive toxins and disease.

Students would also learn "climate shift gardening" – how to prevent soil erosion, neutralise acid rain and its damage; how to obtain maximum wind protection, maximum use of the sun's rays for photosynthesis and absorption of carbon dioxide from the atmosphere; how to encourage plants to flower and seed in harmony with ozone depletion and high levels of radiation (which affect genes and reproduction), and how to achieve greater dependence on tree foods.

A Rock Dust Distribution Service

There is a market for rock dust fertilizer and the potential to expand that market with a suitable advertising campaign, to promote the use of rock dust throughout Scotland. Rock dust sales would be the initial source of income for the Earth Regeneration Centre until the remineralised food has grown and a list of subscribers established. Students would learn about the properties of various dusts, how

Moira with giant cabbage

Willow and Holly with giant turnip

much to use on differing soils and application methods.

Rock dust from various local sources would be bought and analysed. Sacks would be printed with analyses and application amounts. Volunteers would store and package rock dust and arrangement for delivery service would be made, as well as for consultancy service.

An advertising campaign – Stone Flour for Soil Fertility, (SF for SF) – would explain in leaflets the nourishing virtues of rock dust as medicine for soil, plants, animals and humans, with photographs of remineralised produce alongside chemical and traditional organic produce. The Earth Regeneration Centre would hold "Open Days" to advertise the fertility achieved and promote sales of SF for SF labelled sacks.

Customers would be gardeners, farmers, landowners, tree nurseries, orchard and woodland keepers, vets, doctors, council waste-disposal and recycling projects (to increase micro-life in composting operations) and health food shops (for dusts suitable for human consumption).

Scottish Earth Regeneration Newsletter

The remineralisation movement in Scotland is growing. Published quarterly and paid by subscription, the Newsletter would publicise and record the work at the Centre and distribute information about rock dust and SR, regeneration, permaculture, community supported agriculture, the climate shift, and offer solutions.

It would also advertise SF for SF available locally, list Scottish quarries with suitable rock dusts, advertise for participants and volunteers for the Centre, publish letters from readers and answer questions and communicate with farmers or landowners who may be interested in donating or letting a field for an Earth Regeneration scheme, for SR trials or for community supported agriculture.

The venture would require suitable office space and equipment, as well as volunteers to handle the tasks involved.

Visitors' comments:

I am very much impressed by the health and vigour of plants, livestock and humans.

Jock Scott-Park, Farmer
McCarrison Society

What health and vitality bursting from this garden – and the fruit has such flavour.

Susan Mackay
Tayside Organic Gardeners Group

Everything is disgustingly healthy! I really will have to try some rock dust.

Dennis Murray
Tayside Organic Gardeners Group

As a way to make something out of nothing we all have a lot to learn from you.

Anne Robertson

Thank you for giving us the inspiration to develop our own garden and community. It gives hope and pulls us forward.

Jeremy Tucker
St. Andrews University Students
Green Group

Marigold with beets, potatoes and lettuce

From The Men of the Trees Newsletter in Australia

Now the challenge really begins!

TWAHAMWE

The International Society for the Planting and Protection of Trees.

The scientific report on the first season field trials at Amery Acres seems on first study to support the null-hypothesis; that rock dust does not benefit the soil and growth of plants. Further, a ninth trial plot established alongside the official site and testing rock dust enriched worm casts actually produced headless wheat!

Well, that is not so surprising. If rock dust worked just like NPK fertilizer farmers would have been spreading it around for a century or more. So we are now faced with real challenge.

Much has been reported anecdotal from Australia and many parts of the world on how rock dust benefits plants. Our own tree nursery observations bear this out. We have heard of one farmer who uses dust at rates as low as 250kg/hectare (220 lb/acre) and grows a good crop of wheat, free of weeds; also dairy farmers who have done trials of rock dust in strips across their pastures and prove convincingly by the "french flag" look of their land that rock dust is performing positively. The time has come to pin down these garden legends and to bury the myths in good science. How pleased we are to have such input from our friends at the W.A. Department of Agriculture and the University of Western Australia.

We desperately need this investigative science to study, replicate and quantify the positive observations that abound under this heading of 'remineralization'.

It is in acknowledgment of the importance of this venture, for all mankind, and for the restoration of trees as a productive part of the farm, that Men of The Trees in Western Australia are dedicated to maintaining Amery Acres. It is an act of faith for generations yet unborn, who, with the benefit of hindsight, will have expected us to undertake anyway.

Our Destiny

There can be no more pressing need for these times than humanity at large should concern itself with the quality of the Earth's soil. Soil is the darker mystery in which the cycle of nature turns from decay to new life. Ultimately, health and even peace among nations will depend upon how well we care for our land and how well we respect the life of every microorganism, every alga, fungus, bacterium, lichen, and yeast that are the rightful owners of our soil.

Wheat Farmer's Experience

Malcolm Borgward, a wheat farmer from Minivale (Shire of Dowerin), has completed his third season using Diorite dust as a soil ameliorant.

Diorite is a metamorphosed intrusion at the Pioneer Quarry supplying granite to Amery Acres. Applying the coarse dust at the rate of 250kg/ha, his wheat yield was 10 1/2 bags/acre (2.2 tonnes/hectare). For Australia's dryland country that is a good harvest. But his innovative practice also included: 1) no prior cultivation, 2) no use of herbicide either before or after seeding, 3) no application of nitrogen (he seeded into last year's lupine stubble), and 4) no dressing with superphosphate (residual soil test P=25ppm). Although still an anecdotal report it is worth noting.

At the close of the 1993/94 season CBH reported receivals approaching 9 million tonnes, Western Australia's all time record wheat harvest.

Our Allies in Industry

The field trials at Amery Acres have been supported from the beginning by Pioneer Quarries of Herne Hill. Now Richgro Pty Ltd., a market leader in the field of soils and fertilisers, has entered the rock dust market.

Pioneer will supply bulk rock dust to Richgro who will process and market the product under the trade name Resurrection Dust. A royalty will be paid to Men of The Trees to help sustain the research work and the trial farm, Amery Acres, at Dowerin. Men of The Trees express their grateful thanks to both companies and look forward to the venture prospering everyone.

Dairy Farmers testing Rock Dust at Maleny

In August, 1993, Barrie Oldfleld paid a short visit to Queensland, giving talks on the work of The Men of The Trees society and meeting participants in a range of Earthcare projects from tree planting and recycling to remineralisation. At Maleny, he was welcomed by a group of farmers. many of whom were conversant with rock dust and who had established strip trials on dairy pastures. Inspecting one pasture Barrie noted flattened areas in the lushest remineralised grass indicating places where the cows had rested to chew the cud. Dairy farmers might like to comment.

Sorry, too little Nitrogen!

Rock dust so far used by The Men of The Trees comes from granite. Analysis to date has found 36 to 41 elements present and if equipment of sufficient sensitivity were available and we could afford the fee no doubt most of the other elements would be found there too. Notably low is Nitrogen at .002%. Men of The Trees therefore advocates the systematic use of legumes and other nitrogen fixing species in any concerted soil building programme.

Results from the Field

Dr. Mike Bolland, Plant Nutrition Officer with the Western Australia Department of Agriculture, supplied the comments and the tables on this page following the first field trial at Amery Acres, 1993. The farm trial will be continued through 1994 together with pot and glasshouse experiments at the University of Western Australia.

Comments:

1. Granite rock dust tended to decrease grain yield in the absence or presence of NPK, i.e. rock dust did not appear to supply plant available K or alleviate P or deficiencies in any way.
2. Large response to K above NP with rock dust, i.e. site was K as well as NP responsive.
3. Large grains yield increases from NP with rock dust, but there was no NP treatment without rock dust for comparison.
4. Large grain yield increases to NPK in both absence and presence of rock dust.

Table 1 *Grain yields in kg/ha, harvested at Amery Acres, 1993.*

Plot	Treatment	R1	R2	R3	R4	Mean	% max
1	NPK+20t rd	1575	1676	1526	1661	1609	90
2	NPK	1998	1564	1748	1863	1793	100
3	NP+2t.rd	901	917	1176	1492	1122	63
4	NP+20t.rd	651	876	822	713	766	43
5	NPK+2t.rd	1570	1330	1510	1429	1460	81
6	nil (control)	520	543	647	444	539	30
7	2t.rd	317	390	615	536	465	26
8	20t.rd	110	154	361	184	202	11

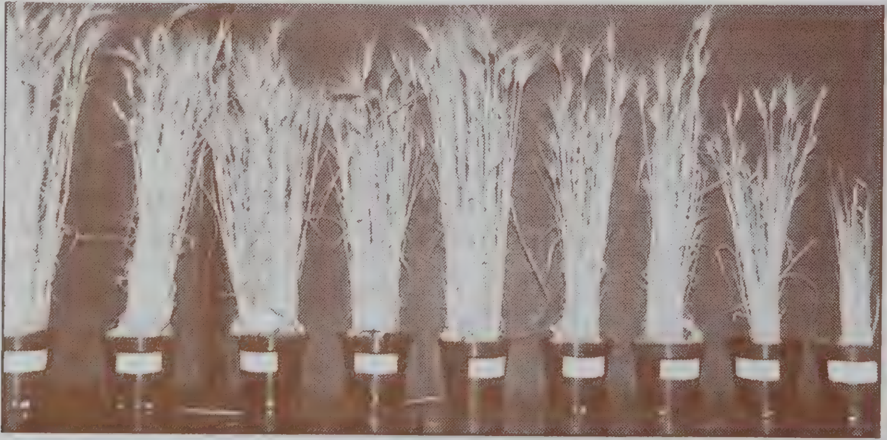
t=tonnes per hectare rd=rock dust
(Plot 9 was not sampled. A search of the plot yielded no grain)

Table 2. Wheat grain yields (t/ha) from Amery Acres at Dower in 1993

Wheat grain yields t/ha

			Crushed granite	Means
Conventional Fertiliser	0(I)	2t/ha (ii)	20t/ha (iii)	(ii) and (iii)
(1) 0	0.54	0.47	0.20	0.34
(2) NP	-	1.12	0.78	0.95
(3) NPK	1.79	1.46	1.61	1.54
Means (1) and (3)	1.17	0.97	0.91	

Fertilisers: N=200kg/ha urea; P=400kg/ha super; Cu,Zn,Mo; K=200kg/ha KCI.
All top-dressed before seeding



Wheat samples, left to right plots 1 to 9, showing the first field trials at Amery Acres, 1993. Note headless wheat on right grown with 1.25t/ha rockdust enriched worm castings. A deluge of explanations is anticipated!

University Lab Field and Glasshouse Experiments

by Dr. Philippe Hinsinger, Research Fellow UWA

Plant roots take up mineral nutrients as ions dissolved in the soil solution which is replenished by various processes such as the decay of organic matter, the weathering of soil minerals and the dissolution of applied fertilisers. A ground rock such as granite dust does not, however, dissolve completely and instantaneously as do conventional soluble fertilisers. Being very poorly soluble in water, it requires acid conditions to dissolve to some significant extent. The chemical process of acidic dissolution of granite dust is likely to be influenced by the following factors:

1) granite dust properties such as chemical, and more critically mineralogical composition (Gilkes *ibid* page 55) and particle size; the finer the particle size, the larger the surface exposed to the dissolution process.

2) climatic conditions; high rainfall and temperatures should enhance the dissolution.

3) soil conditions; the ability of the soil to supply the acid required for the dissolution and subsequently to remove the dissolved ions are likely to be the prominent properties favouring the dissolution of the granite; thus a low pH and a large reserve acidity should enhance the dissolution process.

A first attempt to measure the extent of the dissolution of a fine granite powder in 20 different soils of WA is being studied currently in the laboratory at the University of Western Australia.

Rhizosphere activity

Plant roots and soil microorganisms excrete acid compounds to some extent in the so-called rhizosphere; the volume of soil surrounding roots.

Rocks and Rock Dust

Bob Gilkes, Associate Professor
Department of Soil Science
University of Western Australia

As glaciers melted and retreated from the now temperate regions of the world during the end of the last "ice-age", much of the landscape was carpeted with a silt-sized rock powder. This powder was spread by wind (as loess) and water over large parts of Europe, North America, China, and India and rejuvenated the soils. Similar rejuvenation has occurred in volcanic and mountainous regions in recent times. These areas developed very fertile soils where grain yields up to 10 tonnes per hectare are possible, and only nitrogen fertilisers are used abundantly. West Australian soils were already ancient and weathered during the "ice-age" due to millions of years of exposure to leaching. They did not benefit from remineralisation, but continued to leach and erode, becoming impoverished in many plant nutrients. The only rock powder that persists in most of our soils is the ubiquitous silica (the mineral quartz) together with highly stable minerals such as zircon, ilmenite, and monazite which are now mined from ancient soils and sediments as sources of zirconium, titanium, and rare earth elements respectively.

The rock minerals (crystals) that provide the fertility of rock dust must first weather to release their contents of plant nutrient elements to soil solution. Depending on the source rocks of the dust, different amounts of elements are released. The following table provides a summary of the major rock types and some of the elements they contain. In addition to the amount of minerals and elements present in a rock we need to consider the rate at which the mineral will react with soil acidity and release the elements to soil solution. (See article by Philippe Hinsinger'. *Ibid* page 54)

Rock Type	Major Minerals	Major Elements*	Minor Elements
Igneous Rocks (Felsic)			
granite	quartz	Si	NIL
diorite	K, Na feldspar	Si, Al, K, Na, Ca	Cu
rhyolite	mica	Si, Al, Fe, Mg, K	Co, Mn, Zn, Cu, F
andesite			
Igneous Rocks (Mafic)			
Basalt	Ca feldspar	Si, Al, Ca	Cu, Mn
dolerite	olivine	Si, Mg, Fe	Co, Mn, Zn, Cu, Mo
gabbro	pyroxene	Si, Mg, Fe, Ca, Al	Co, Mn, Zn, Cu
ultra-mafic	amphibole	Si, Al, Mg, Fe, Ca	Co, Mn, Zn, Cu
Sedimentary Rocks			
Shale	clay minerals	Si, Al, Mg, Fe, K	Mo, Cu, Mn, Co, B, Zn
	oxides	Fe, Al, Mn	Co
sandstone	quartz	Si	Nil
limestone	calcite (lime) $CaCO_3$	Mg	
Metamorphic Rocks			
schist	mica, chlorite	Si, Al, Mg, Fe	Mo, Cu, Mn, Co, B, Zn
quartzite	quartz	Si	NIL
marble	calcite	Ca	Mn

* All these minerals contain much oxygen and can be considered as mixtures of oxides. Minor amounts of other minerals including sulphides (S, Cu, Zn) and phosphates (P, F) occur in most rock types.

Rock dust insights reach beyond soil chemistry

Resonance effects could be confusing field results at Dowerin.
Research shows potassium and improved soil wetting could benefit crops.

Report No 7 for March 1995 by **Barrie Oldfield**

TWAHAMWE

Throwing the research net wider

Can igneous rock dust provide an answer to the fast failing soils of the Earth? Can it restore the strength of a native soil and improve the health status of plants and animals dependent upon it? That is a major task of the Men of the Trees' Tree Farm Project whose first objective is to use environment-enhancing trees to provide non-sacrificial crops for improving the prosperity of broad-acre farming.

Field trials at the Society's trial farm, Amery Acres at Dowerin in the heart of Western Australia's semi-arid grain belt, continued through 1994. In the wake of somewhat conflicting results from the previous year but with the benefit of at least one neighbouring farmer who showed a positive response to Diorite dust *(Report No 6)* a series of 48 trial plots were set up for 1994, replicated and randomised. Interestingly, the one plot that gave a positive performance was that which most nearly replicated Malcolm Borgward's kinesiology determined field treatment from 1993. See "Amery Acres crop trials 1994" *ibid p4.*

UWA Professor Bob Gilkes' masters student, Cathy Coroneos, turned in an excellent year's work. Her pot trials showed not only that granite rock dust could release K to plants, but retained K against leaching which sandy soils dressed with KCl could not. Her observations also showed that as little as 0.05% granite dust added to a non-wetting soil could halve water infiltration time. See "Granite dust as a source of potassium for plants" *ibid p2-3.*

Work in Austria shows promise

Meanwhile, hoping to shorten the research time the writer and his wife visited Austria in July/August where they met Dipl Ing Georg Abermann who has successfully helped dairy farmers improve their pastures through the use of rock dust over the past 13 years. The result: a 22-minute video and recommendations for implementing similar trials elsewhere. See "Rock Dust builds good Pastures" *this page.*

Changes in background radiation

The Austrian tour then led on to a meeting with Dr Maria Felsenreich who, with the late Dr Gernot Gräfe has been studying the health of forests and water in Austria for many years. A direct result of this meeting was the return visit to Western Australia of Dr Felsenreich together with Monica Gassner and Dr Alexander Fries-Tersch in January 1995 where they carried out observations and treatments and recommended further work. This episode has given one of the most challenging notions for researchers to consider, that global changes to background radiation as a result of technological developments over the past sixty years have adversely affected plant health which homeopathic treatments with rock dust and selected humus materials might be able to correct. See "Monitoring radiation disturbances in plants and water" *ibid p4.*

As with previous Reports in this series, readers' comments are invited with the object of improving our understanding of rock dust and its use in building health in soils, water, plants and animals.

Rock Dust builds good Pastures

Dairy cows make one major decision in Austria. They show their farmers that pastures dressed with diabase rock dust are preferred. That's the way Georg Abermann sells *'Biolit urgesteinsmehl'* from his quarry at Oberndorf, he gets the cows to do the 'talking'.

Not only do the cows prefer such pastures which become rich in clovers, but their milk production increases and their calving mortality drops. Thanks to the endorsement by these bovine consumers sales of Biolit have steadily increased over the past 13 years to the present annual level of 12,000 tonnes, approximately 2% of total quarry output. Most rock dust is bulk delivered in 26-tonne tanker trucks direct to the slurry tanks on the farms. Here it is mixed directly with the effluent which will go back on the pasture after forage harvest. An ideal dressing rate of 800kg/hectare per annum avoids the need for artificial fertilisers in most cases. The dust is also put up in 7kg and 10kg bags for home gardeners.

Georg Abermann (left) *and Barrie Oldfield at Oberndorf where they made a video on pasture improvement with diabase rock dust.*

Biolit is ground to a dust finer than 70 microns in a mill at the quarry. Bulk price is 400 schillings/tonne plus transport. However, for those farmers who cannot afford the fine dust Abermann will supply a graded dust screened through a one millimetre mesh at 160 schillings/tonne.

Diabase is a volcanic rock with an average silica content of 51%. It rises in a lens beneath the dolomite of the Hartstein Mountains where it is quarried.

In August 1994 the writer recorded interviews with Georg Abermann and has incorporated them with pasture management sequences into a 22-minute video programme *'Bellamy's Big Bang Theory'*. This video, featuring TV Botanist David Bellamy, describes the theory and at least one successful use of rock dust. It is available for Australian$60 from the address on the back page.

Enquiries regarding Biolit™ Urgesteinsmehl should be addressed to Dipl Ing Georg Abermann at Sanvita, Handelsgesellschaft m.b.h., A-6372 Oberndorf, Hartsteinwerk 3, Austria, Fax +43 (05356) 4333 28.

GRANITE DUST AS A SOURCE OF POTASSIUM FOR PLANTS

Catherine Coroneos.
Supervisor Prof R. J. Gilkes, Soil Science and Plant Nutrition, University of Western Australia.

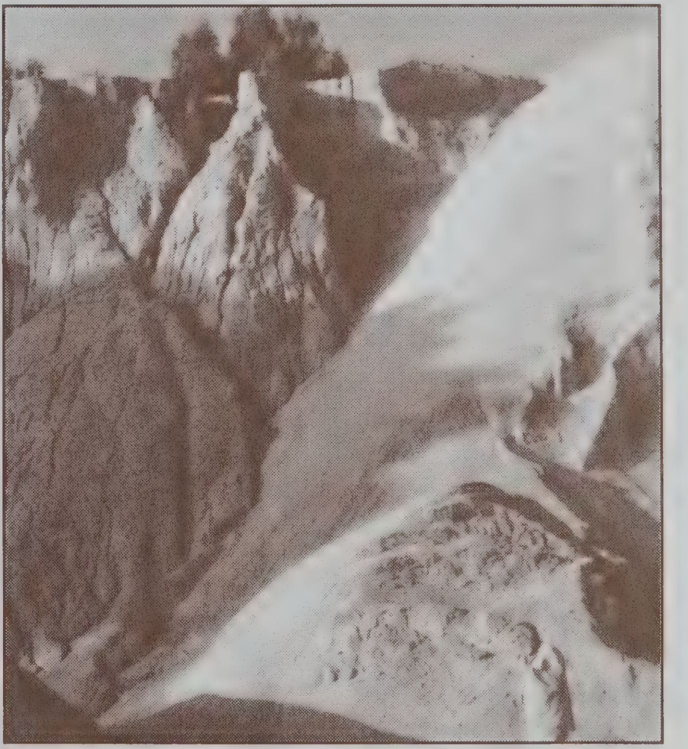
OVERVIEW

Soils form from the gradual weathering of rock. As crystaline minerals in the rock dissolve, elements are released into the soil solution. Once in solution these nutrients become available to plants, but are also vulnerable to loss from the soil due to leaching. For a soil to remain fertile it requires the continual replenishment of nutrients. These can be supplied naturally through the deposition of fresh, unweathered rock (eg. volcanic ash, deposition from rivers and retreating glaciers); or by the application of soluble fertilisers.

Soils in W.A. are ancient and deeply weathered, and have not received the recent deposits of fresh material like the more fertile regions of the world. Being sandy and infertile, heavy and continual applications of fertilisers are required to maintain fertility. This practice is becoming increasingly expensive, both economically and environmentally (eg. eutrophication of waterways).

Rock dust, the finely-ground rock waste-product from quarries, consists of unweathered rock, and with its fine particle size mimics the natural depositional materials. Thus the addition of rock dust to the local exhausted soils could potentially rejuvenate them. Local interest in granite dust (available from quarries in the Darling Scarp) is increasing, but its current usage is generally confined to alternative forms of agricultural production such as 'organic' growing.

This feature shows the results from a recent study evaluating the addition of granite dust to local soils. The results suggest granite dust can supply potassium (K) to plants but not as effectively as applications of soluble fertilisers. It may become a useful addition for low input agriculture such as grazing and forestry, or to improve non-wetting soils.



Granite and diorite are quarried at Herne Hill, W.A. by Pioneer Quarries. Granite dust is an under-utilised byproduct of the crushing plant. This stockpile contains 12,000 tonnes and is 30m high. Note Prof David Bellamy for scale, busily encouraging research into rock dust.

THE MATERIALS

This analysis shows that there is much K in granite dust. The K is mostly present in feldspar crystals. Feldspar can dissolve into the soil solution, releasing K which is then available to plants.

ELEMENTAL ANALYSIS	%
SiO_2	74.8
Al_2O_3	13.1
Na_2O	4.03
K_2O	3.85 = 3.2% K
Fe_2O_3	1.68
SO_3	1.07
CaO	0.79
MgO	0.51
TiO_2	0.11

MINERALOGY

Mostly the silicates

Quartz
containing only SiO_2

Feldspars
also contain much K, Ca

Micas
also contain K, Mg, Fe

OTHER EFFECTS WITH GRANITE DUST

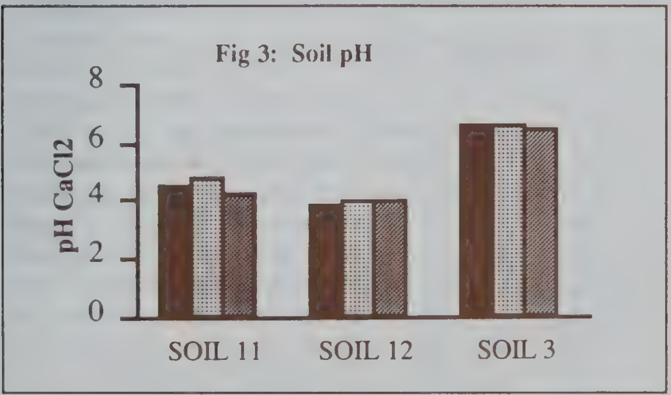


FIGURE 3 *Rock Dust does not alter soil pH. Some literature reports a liming effect (increase in pH) with time as rock dissolves.*

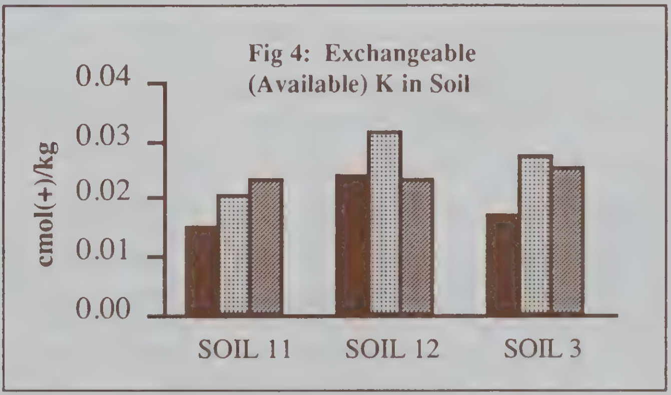


FIGURE 4 *Rock Dust increases exchangeable K in soil. K dissolving from rock into soil solution becomes available to plants. This accounts for higher amounts of K and increased yield in plants.*

Experimental Design

Three plant species were grown in K-deficient soil. Treatments containing additions of all soluble nutrients including K ("KCl") were compared to treatments with all nutrients except K ("CONTROL") plus 2% Granite Dust ("ROCK DUST").

Granite dust supplies potassium to plants

Fig 1:
Yield of Shoots

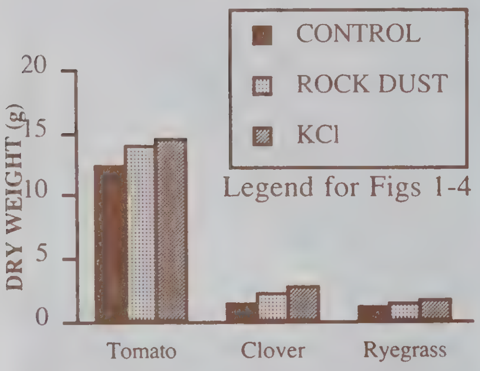


Figure 1 *This graph quantifies trends seen in the pot plant photos. Yield is higher for Rock Dust than for Control, but lower than for soluble K treatments.*

Fig 2:
Potassium uptake

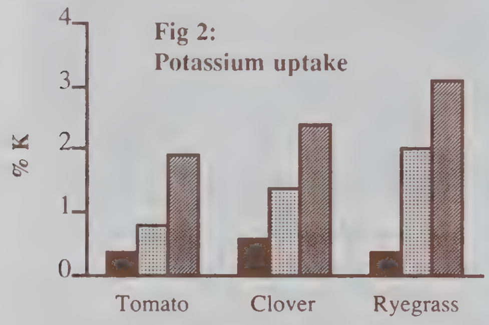
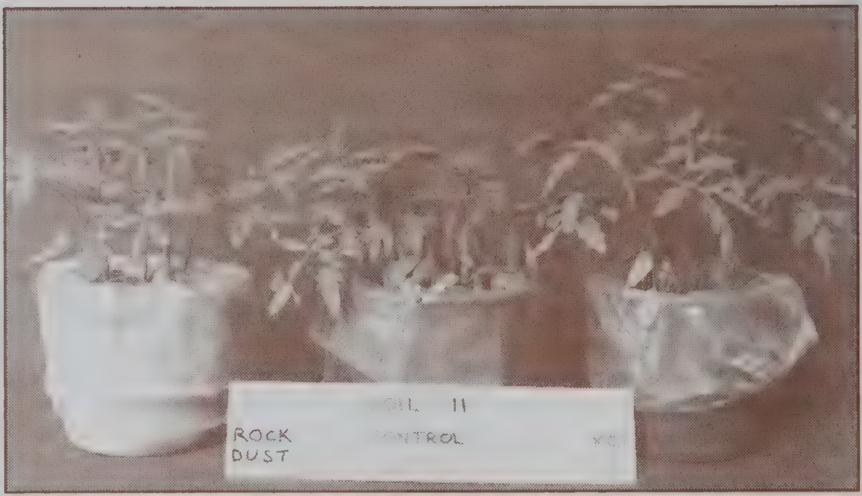
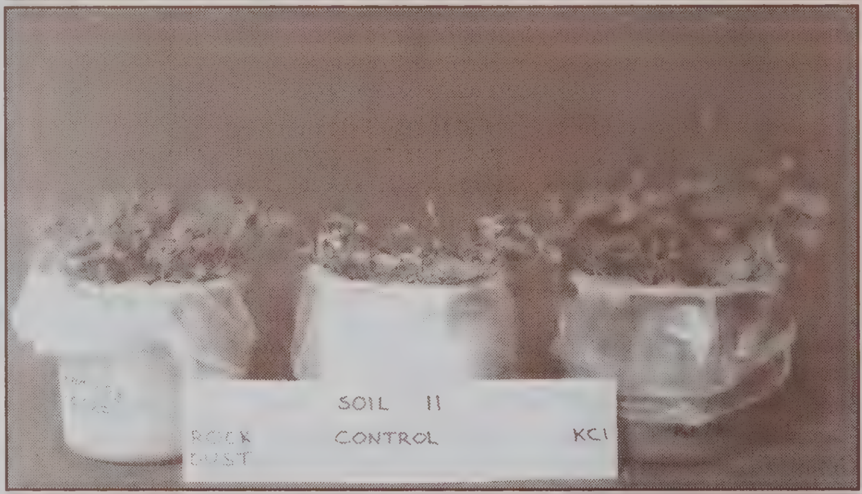


Figure 2 *The differences in the amounts of K between treatments account for the yield differences in Figure 1. Plants grown with Rock Dust contain more K than Controls, implying Rock Dust can supply K.*





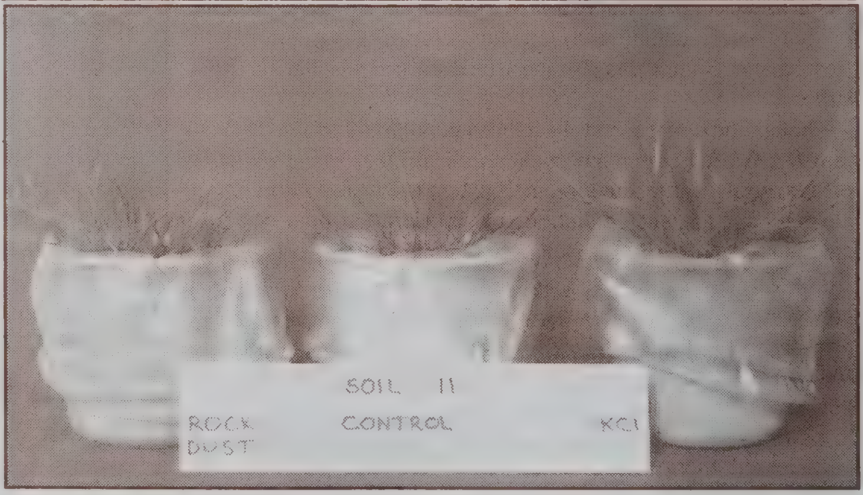


Fig 5: Time for 40µg Water Drop to Infiltrate Soil

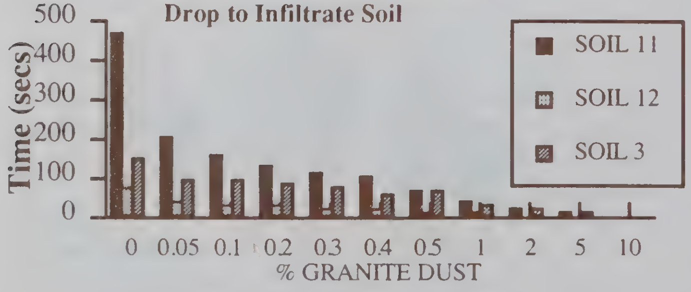


FIGURE 5 *Additions of as little as 0.05% Rock Dust increase water infiltration rates. Farmers may be able to use Rock Dust to aid wetting of soils.*

K DEFICIENCY

These photos show foliar symptoms of K deficiency, salmon-coloured blotching of the oldest leaves graduating to necrosis as the K is mobilised to the youngest leaves. K is a macronutrient for plants functioning in several major biological processes, including enzyme activation and stomatal opening. Growth differences between treatments are also evident. Plants grown with Rock Dust are larger than Controls but smaller than the KCl treatment. Rock Dust appears to be supplying K but at a lower rate than the KCl.

Further reading...

The contents of these two pages are substantially from Cathy's poster. Her thesis is available for study and a full page feature she prepared for COUNTRYMAN available, address overleaf.

Dr Maria Felsenreich with an old grape vine at Houghton's vineyard near Perth. Grape remains play an important role in providing desirable humus which is used together with certain rock dusts for the elimination of electromagnetic disturbances.

Monitoring radiation disturbances in plants and water

Concern for the rise in background radiation brought about by the technologies of the past fifty years has stimulated another avenue of research into rock dust.

Dr Maria Felsenreich who, with the late Dr Gernot Gräfe has spent many years studying the dying forests of Europe, visited Australia as guest of Men of The Trees in January 1995. She was accompanied by co-researchers Mrs Monica Gassner and Dr Alexander Fries-Tersch. They are all members of the European Group for the Study and Elimination of Electromagnetic Disturbances in Landscapes and Settlements. Their understanding is that water, common to all life, carries a certain natural 'resonance'. Should this resonance be disturbed then the life forms suffer.

Though the dying forests have been popularly attributed to acid rain the Gräfe/Felsenreich studies indicate that rising radiation effects are also implicated. Numerous studies by other workers are also indicate that such radiations can be harmful. Four principal causes are: 1) the rise in background atomic radiation following fifty years of nuclear age test explosions and accidents, 2) electromagnetic radiation due to telecommunications, particularly satellite technology, radio, tv, radar, 3) increased roentgen radiation from the Sun as a result of the thinning of the ozone layer, and 4) magnetic fields generated by power transmission lines.

Conservation of Energy Principle

Increased energy from these radiation sources was not being taken up profitably by soils and plants. As energy can neither be created nor destroyed ill effects are becoming apparent. To date the Gräfe/Felsenreich observations have shown that remedies may be effected by relatively simple 'acupuncture' treatments employing selected rock dusts and humus materials.

Following their visit a working group has been formed in Western Australia to carry on with the studies and to carry out treatments through a series of field days. A manual has been prepared which will be updated as further observations are made. Included is a video production showing the methods used to determine location and method of treatments. Readers wishing to receive this information package should send $50 with their request to the address in the box.

Amery Acres crop trials 1994

A total of 96 trial plots were set up at Men of The Trees trial farm Amery Acres in 1994. 48 different treatments comparing various rock dusts and rates together with conventional fertilisers, humus and soil bacteria were compared. All plots were replicated and randomised. The crop grown was Aruna variety wheat.

The most significant result came from the treatment with diorite dust, more or less replicating the success achieved by neighbouring farmer Malcolm Borgward as written up in Report #6. Figures and graphs from the 1994 trials together with plot diagram and accompanying notes can be made available for $12. Correspondence will be entered into.

Lupin crop for 1995

1995 will see the trials continue with the seeding of a lupin crop. Offers of help, advisory, practical, financial or technical, are as ever welcome. We particularly need at this time a small tractor driven harvester.

A big hand please...

The farm is leased and run by Men of The Trees, a voluntary Society which receives no direct government support. Donations made to "Men of The Trees Public Environmental Gift Fund" are tax deductible. We are pleased to record our thanks to Pioneer Quarries who continue to support our work and the publication of this Report, to the Dowerin Shire Council, to Prof Bob Gilkes and the University of Western Australia, to Mike Baker and Dr Mike Bolland of the Department of Agriculture, to Dr John Fox and Dr Jonathon Majer and Curtin University, and to Dr Frank Flanagan and Edith Cowan University.

Downstream research underway

Students of consumer science at Edith Cowan University are undertaking a sensory perception trial for Men of The Trees. Under the supervision of Dr Frank Flanagan and Judy Gedeon they will develop a biscuit using flour from both rock dust grown and conventional wheat. Tree seedlings grown in a rock dust enriched potting mix do not exhibit the occasional caterpillar nibbling the tip leaves as seedlings grown in a conventional medium. If insects can tell the difference, what about human beings? Trudy Mitchell and Janelle Dean are our student researchers.

John Hamaker r.i.p.

We were saddened to hear of the death of John Hamaker in July 1994. His book, *The Survival of Civilisation* probably did more to promote rock dust research in later years than any other initiative. The writer was pleased to receive a letter from JH as late as May 94 advocating the use of moraine gravels (mixtures of sedimentary and igneous rock), emphasising that rock dust feeds soil micro-organisms *not* the plants, and urging the recognition that a healthy soil breeds up bacteria which can utilise all the atmospheric gases including nitrogen.

Proudly sponsored by

Pioneer

Amery Acres is a trial farm operated for
The Tree Farm Project by
The Men of The Trees (Inc)
Western Australian Branch
3 Over Avenue, Lesmurdie, WA 6076, Australia
Telephone (09) 291 6619

TWAHAMWE

Point of View

Scientific Remineralization

by William S. Peavy, Ph.D.

Several years ago, I carefully read both *Bread and Stones* by Julius Hensel and *The Survival of Civilization* by John Hamaker. The concepts of both writers were good, but I felt these concepts needed to be integrated with the findings of certified soil scientists and plant nutritionists. These included my own research and that of Dr. William Albrecht, chairman of the Dept. of Soil Science, University of Missouri, and Dr. Firman Bear of Rutgers University. The findings of all three of these researchers supported the idea of remineralization, but they went further to detail the process.

Remineralization is a worthy and much needed goal, but what are the specifics of doing it? Which minerals are we talking about? Where do we get the minerals we need? How much of each one do we need to apply to enrich our soils, and how do we balance our soils? To answer these questions I embarked on a five year literature review and research program. The result is our new book *Super Nutrition Gardening*, published in 1993 by Avery Publishing.

In 1890, Julius Hensel advised remineralizing with a mixture of 10 parts of granite powder, 3 parts limestone powder, and 2 parts gypsum powder. Granite is an igneous rock that supplies potassium when finely ground. Limestone (dolomite) is a sedimentary rock that supplies calcium and magnesium. Gypsum is a sedimentary rock that supplies calcium and sulfur. Add phosphate rock powder plus 3-5 percent humus to a soil to supply nitrogen and you have all of the six major nutrients that make up 99.6 percent of the mineral matter plants absorb from the soil to produce a bumper crop. Page 3 of *Super Nutrition Gardening* details this.

Rock powder from granite, limestone, and gypsum was Hensel's recipe for remineralization, but the question that arises here is this: Will Hensel's recipe fit all soils? Having studied test reports from hundreds of soil tests, it was clear to me that no two soils are alike. Each is different and should be treated according to its individual needs. Dr. Albrecht and associates supplied the answer. Their research found that a soil which is properly mineralized and balanced grows crops with a minimum of pest problems and of maximum quality. They found that a properly mineralized and balanced soil had a pH of about 6.5, and had about 85 percent of its fertility-holding capacity (CEC) filled with three key mineral elements – calcium, magnesium, and potassium. Further, they found that these should be present as follows; about 70 percent calcium, 12 percent magnesium, and 3 percent potassium. How to implement this advice?

Here is where a good soil testing lab and consulting agronomist comes in. You must first inventory your soil to find out what you already have on hand, figure out what is lacking, then add the specific kinds of minerals in the proper amounts to fill in the blanks. This is detailed in my book, pages 70-74, 220 and 222. Brookside Farms Labs of New Knoxville, Ohio, or A&L Labs will test your soil and send you the inventory (soil test report). This report will show you what is missing. If you have a farm, and request it, their consulting agronomist will tell you what to apply and how much to apply. They do not handle home gardens, so I can provide the "what to add and how much" information in these cases.

Before we wrote our book, we did about three years of field tests to implement the advice of Hensel, Albrecht and Hamaker. The results showed we were on the right track. Food crops grew better and nutritional quality went up, as shown by lab analysis of our harvest from treated plots. These data are shown in the tables in Chapter 2 and 6 of our book.

Now about big chemical companies funding university research: it is true that they do this, but the fact of the matter is that they fund *only part of it*, perhaps most, but not all of it. Your and my tax money fund the rest of it. What the percentages are is unknown. I was part of a major university system for about 20 years and know for certain that some good basic research is being done. Let's not throw the baby out with the dirty water. To earn my last advanced degree, I spent literally hundreds of hours searching for, finding, and poring over hundreds of research studies in the Kansas State University Library. As a result of this, it is my opinion that most of the best good basic research on plant nutrition and soil fertility was reported from 1940 to 1960. This means that the research that led to these old, carefully-written research reports was done from about 1930 to 1950. After that time the research seemed to be sort of frivolous, as if the object was "to learn more and more about less and less so that pretty soon we know everything about nothing." This is not to say that no good research has been done since then. It's just hard to find it. My own private research done recently was of the old, basic type, but not published in an official journal. It is difficult, time-consuming and expensive to do good research, and if the findings are unorthodox, it is difficult to get it published.

Basic scientific studies at universities *not funded* by vested interests have shown which mineral elements are essential for normal plant growth and how many pounds of each are removed per acre at harvest. There are about 17 of these essential elements, and these are listed on page 3 of our book. We have tabulated six major vegetable crops which, under high yields, remove about 645 pounds of minerals per acre at harvest. This removal consists mainly of six major

continued on page 77

William S Peavy holds a PH.D. in horticulture and agronomy, Kansas State University, 1972. He writes to say he greatly appreciates the review and says he did not intend to lead the reviewer to believe he had not read John Hamaker. He has, and fully supports the concept of soil remineralization.

Book Reviews

Electrolytes: The Spark of Life

Gillian Martlew, N.D.

Nature's Publishing, Ltd.
PO Box 361, Murdock, FL 33938-0361, 1994, 95 pp., $11.95

by Don Weaver

Acknowledging and further expanding upon the work of "great Trailblazers" in trace-mineral (electrolyte) research – citing John Hamaker, William Albrecht, Henry Schroeder, J.I. Rodale, Carl Pfeiffer, and others – author Gillian Martlew has given the soil remineralization movement and the world a valuable synthesis of research and evidence proving further the universal requirement for Health: a balance of all essential minerals in soil and cell!

From the introduction by Dr. Bernard Jensen:

> *Most people do not realize the importance of electrolytes in their bodies.... we must get good clean water, fresh air, sunshine and nutrients from living plant life in order to bring the finer forces into our bodies. We must understand the importance of the soil. It must be rich in the elements that are necessary for the life and health of man so that the plants can absorb these elements and we can then nourish the cells of our bodies with them. We cannot rejuvenate our bodies properly without these finer elements which are so minute that they are difficult to see even under a high powered microscope... We cannot heal a person through symptomatic relief. We must go to the root of the problem – to the cell itself – where electrolytes are at work giving life. It is here that real healing can begin.*

To order the book
Electrolytes, Spark of Life
call 1-800-950-1929.
The price is $11.95 plus $2.00
for shipping and handling.

Don Weaver, is co-author of The Survival of Civilization

And from the author's preface:

> *At the risk of sounding pompous, I'm going to suggest that the information in this book breaks the rule' that everyone is different, and therefore no single piece of information applies to every person... the significance of the material you are about to read affects every human being, every animal and every plant on this planet – even this planet. ...If everything ailing us was reduced to its lowest common denominator, aside from the individual considerations and psychological aspects of each, every affliction would have, somewhere in its etiology, a lack of electrolytes or trace elements. These minute nutrients are involved at the fundamental level of every one of the body's functions. ...If we think that good nutrition alone will make us completely healthy we are in for a rude awakening. Likewise, it doesn't matter how spiritual we are, how much yoga, meditation or exercise we do, or how much we have learned to use the power of our minds. The body still needs the basic materials or it will never be totally healthy.*
>
> *In this crazy world we've created where the body, mind, and spirit are constantly subjected to things our ancestors couldn't even dream about, basic good nutrition has never been so important. We have gone against nature, depleted and poisoned the air, water, soil ,and food, and are reaping the negative payback as cancer, heart disease, AIDS, and other degenerative and immune disorders.*

Naturopathic Dr. Martlew is one of a growing number who has understood some of the key reasons why we must remineralize the soils.

Further addressing the soil-health connection, she states: "In U.S. Senate document number 264, written in 1936, it says 'Sick soils mean sick plants, sick animals, and sick people." Today, after nearly six decades of continuing to sicken and deplete the soils, degenerative disease is at an all-time high. The U.S. now ranks at the same level as Third World countries with respect to health. And the $750 billion or so that is spent on health care annually in this country has done nothing to prevent Americans ranking 17th in the world in longevity, 19th in general health and 23rd in infant survival, according to W.H.O. figures." (p. 6)

The book discusses many specific health and behavioral problems known to heal with restoration of trace element balance and healthful living, such as cardiovascular disease, cancer, immune system (or health system) weakening and hyperactivity in malnourished children. The dangers of eating refined sugars and other products deviating from our biological-ecological norm of whole natural foods are pointed out with an emphasis on the great trace element drain to our body's reserves when it is required to metabolize and eliminate such 'foods'. Virtually any stress or over-indulgence can deplete mineral, vitamin and other nutrient stores, hence soil and dietary deficiencies can in short order prove a "recipe for disaster". John Hamaker has pointed out how the disaster can be a shared global experience!

Two other impressive points she makes should be understood. Our brains are very mineral-dependent for their proper function, as is every cell in the body! Again quoting her:

> *Minerals, especially electrolytes, are also an integral part of the 'soup' that carries chemical messages in the brain and nervous system. The human brain contains billions of neurons (nerve cells), each of which can connect to others, but are separated by minute gaps called synapses. Electrical neurological impulses travel by leaping across the cell-to-cell gaps, and that's how the connections are made and our brain and nervous system functions. In order to perform these biological acrobatics, the signals need a helping hand*

from substances called neurotransmitters, and these are made from, and stimulated by, electrolytes and macro-minerals, amino acids, choline and other nutritional factors." (p. 62)

And from the concluding chapter:

Healthy cells are kept round by osmotic pressure or osmotic equilibrium – an opposing fluid pressure between the minerals on the inside of the cell and the minerals on the outside of the cell. It is a critical balance and protects the autoimmune system in two specific ways: 1) Bacteria or viruses cannot enter a healthy cell, as the walls are strong and impenetrable. 2) Trace minerals ensure that the pH of the cell is unfriendly to invading microorgani sms.

The body must receive an adequate mineral supply to maintain in each cell what is known as osmotic equilibrium. Approximately five percent of each cell should consist of minerals. According to Dr. Jerry Olarsch, 'As we become deficient in trace minerals, the cell walls weaken and become irregular in shape, and their pH is upset. As the cell wall pressure breaks down, a virus can attack the weak spot and break in. If the cell's pH is unbalanced, it becomes host to the virus, bacteria ad so on, and this is the beginning of disease, whether it is a cold or cancer. [The quantity of toxic waste products is also known to be important.–DW)] Electrolyte balance is the critical factor. There is nothing else in nature which keeps cells round and strong. [I would think the quality and balance of amino acids, lipids, vitamin cofactors and food enzymes would be playing complementary roles. – DW] The body's pH and cell health, in addition to immune system strength, is the ultimate weapon against disease. This can come only through mineralization of the body. We have overlooked the most basic thing in our diet, and as a result are running after a million cures. We can't see the forest for the trees. (pp. 73-74)

If we wish to reverse the current degenerative cycles it seems clear that we need to move quickly out of our habits of exploiting and shortcutting Nature, and remineralize and regenerate the Earth together, 'from soil to psyche'. I don't think the author would disagree with this view, as I read her comments concluding a discussion of the chemical farming addiction.

I found this book to hold much of obvious value and to be well worth reading.

The Enlivened Rock Powders

Harvey Lisle

Acres, U.S.A.
1994, 194 pp., $15.00

by Joanna Campe

Harvey Lisle, author of *The Enlivened Rock Powders* draws on his background as a chemist with Brookside Laboratories, and as a biodynamic farmer and well-known dowser.

His interest in rock powder goes back thirty years to his work at Brookside Labs and to his familiarity with Flora-Stim, Planters II Soil Conditioner, as well as later developed products, such as Clodbuster.

In the book he divides rock powders into three categories: silicas, clays, and lime, with thorough chapters on each.

Throughout the book there are references to Rudolf Steiner and biodynamic agriculture. This new book is for those especially interested in remineralization from a biodynamic/ homeopathic perspective. Where John Hamaker advocates SR by directly observing and imitating Earth's own processes through glaciation, volcanic eruptions, and alluvial deposits, Lisle seeks a spiritually attuned approach that *harmonizes* with nature, rather than *imitates* nature, as in biodynamics.

Enlivened as defined by Lisle is *containing and transmuting spiritual forces.* Enlivened rock dust has a high paramagnetic value. There has been a great interest in paramagnetic values of rock dust in recent years in the publication ***Acres, USA*** – from Phil Callahan and Arden Andersen to Harvey Lisle.

To measure magnetic susceptibility, a new meter which is simple and more economical has been developed by Dr. Phil Callahan and is manufactured by Pike Agri-Lab Supplies in Strong, Maine. It is called a PCSM meter. Harvey Lisle dowses to determine paramagnetic values.

Especially fascinating is the idea that if rock powders have a high paramagnetic value, then lesser amounts are needed for good results, even as little as 250 lb/acre. This is being practiced with success by biodynamic farmer Hugh Lovel and others.

There are many people around the world who are part of the SR network and share this focus.

Earl Grey of Panoramic Gardens in New Zealand began doing scientific pot tests and then began dowsing and experiments that were supported by the New Zealand biodynamic community.

The late Dr. Gernot Graefe and Maria Felsenreich began with scientific studies and developed their work based on dowsing and homeopathic formulations of rock dust for forests, streams, and lakes. Dr. Maria Felsenreich, Monica Gassner, and Dr. Alexander Fries-Tersch continue to monitor radiation disturbance in plants and water and affect plant health with homeopathic treatments of rock dust.

Hamaker's approach is the most likely to be accepted by scientists and ***RE*** has worked very hard to establish credibility for remineralization as advocated by Hamaker, and has a body of research from all over the world behind it. *The Enlivened Rock Powders* will appeal to those interested in exploring an energetically oriented approach.

The SR community is exploring remineralization in many different directions and ***RE*** will continue to report on these possibilities and developments. This includes differing methods and amounts of application, various formulations of rock types, products combined with microorganisms and organic matter and so on.

Alexander Podolinsky is a leader of the biodynamic movement in Australia where over 2 million acres using biodynamic methods are cultivated. He has also recommended SR as advocated by Hamaker to his farmers. Lisle's approach considers both: biodynamics can benefit by adding rock dust and SR will need less amounts for application if paramagnetic value is considered.

The outstanding needs for restoring soils of farmers transitioning to organic needs to be given specific consideration. Here, bioremediation of soils needs to take place and the farmer needs consistent results from year to year. Neo-min in Australia has given a particular focus in this area to maintaining a healthy mineral balance and at the same time laying down a paramagnetic field on the croplands in combination with specially selected microbes. Ken Hahn of K-IDA-AG has a soil product which has paramagnetic rock dust combined with microbes. Tests performed a year later have shown no signs of chemicals in soils of farmers who previously used chemical fertilizers after using the product. These products and SR have the potential to greatly decrease the transition time usually needed for mainstream farmers to become certified organic.

On one side of Hamaker is William Peavy, author of *Super Nutrition Gardening* who with his book takes Hamaker's idea and puts it into what he considers a more "scientific" perspective and practice and Lisle on the other side who is concerned with the energetic and spiritual focus. These are clearly some of the future directions remineralization is taking for some farmers and gardeners.

The Enlivened Rock Powders is published by ***Acres, U.S.A.***, P.O. Box 8800, Metairie, LA 70011, (504) 889-2100 and available through them, #6103 for $15.00 plus postage. Harvey was the keynote speaker this year at the annual *Acres, U.S.A.* Conference.

Remineralization Utilizing Rock Dust of Various Types to Revitalize Soil

Daniel E. Winter

Circle of Life
137 Biodome Drive
Waynesville, NC 28786
275 pp. $20.00

by Joanna Campe

This is a large compilation of data and articles to educate readers about SR from different perspectives. This volume of articles includes one by the author entitled *Completing the Hologram: The Role of Trace Minerals and Soil Magnetics in Sustainable Agriculture,* prepared for the occasion of the Soil Remineralization and Sustainable Agricultural Forum in Beltsville last May. The compilation includes not only articles on SR but general information and topics such as pesticides and the toxicity of chemicals, pesticides in fruits and vegetables, minerals in the human body, nutrient interactions, soil organisms, and the chemistry of rocks.

Notable Mentions

Natural Pest Control, Alternatives to Chemicals for the Home and Garden, Farmer and Professional

This book by Andrew Lopez has a forward by Eddie Albert. Andrew Lopez is known as The Invisible Gardener of Malibu and he has a newsletter called *The Invisible Gardeners of America,* since 1972. The book contains a few chapters on rock dust for compost, pest control, in the garden and for the lawn. To order the book or newsletter or get advice from the invisible gardener himself, write The Invisible Gardeners of America, P.O. Box 4311, Malibu, CA 90264, or call 1-800-354-9296. The book is $19.95.

The Stardust Foundation Makes SR Booklet Available

Donald J. Supkow, Ph.D., Senior Hydrologist and Director of the Stardust Foundation, a non-profit foundation dedicated to disseminating knowledge about how we can improve the environment, has come out with a booklet called *Rock Dust and the Environment: Investments that Pay BIG $.* The booklet, available for $1.50, is a good way to introduce people to remineralization. It's full of questions and answers about rock dust, case studies for agriculture and forestry. Copies of this book can be obtained by sending a business size stamped (2 stamps) self-addressed envelope and $1.50 to the Stardust Foundation, Donald J. Supkow, 28 Sefton Circle, Piscataway, NJ 08854.

Hoops Across America

The book by Leonard Sarki is about a life changing, 4-month, 5,000-mile journey from the Pacific to the Atlantic, promoting personal and planetary healing that included soil remineralization. Two Sedona natives (Stretch Cunningham and Hoops Malone) captured the hearts of America as they shared experiences with anyone ready to play. 207 pp., including pictures and resource listing. $13.95 ppd. Leonard Sarki. P.O. Box 663, Sedona, AZ 86339.

Helmut Snoek Has New Book on SR in German

For German speakers, Helmut Snoek has come out with an economical paperback called *Steinmehl, Alles über Gesteinmehle und deren Anwendung, (Stone Flour, All About Stone Flours and their Application).* Helmut Snoek, Hochgratstrasse 6, D-8996 Opfenbach, Germany.

Letters and Forum

INTERNATIONAL

Bolivian Geologist

A farmer friend has just shown me the June-August 1993 *Permaculture International Journal*, which contains a brief but intriguing mention of ***RE***. I am a mineralogist/geologist doing research on the minerals of Bolivian mines and quarries, and one of my research topics for the past couple years has been the potential use of rock powders as agricultural fertilizer, including even the recycling of some mine wastes as fertilizer (although one must be careful with this since many mine dumps contain high levels of toxic heavy metals).

Bolivian soils are very depleted through deforestation, erosion and overgrazing; ; people are too poor to buy commercial imported fertilizers, and anyway I am opposed to the use of concentrated water-soluble fertilizers. Presumably you are not a fan of commercial fertilizers, or you would not be publishing this magazine. I am delighted to see that in the U.S.A. other people are also interested in this subject!

Alfredo Petrov
Cochabamba, Bolivia

Doubts about SR

I am having a bit of trouble with SR. I read Hamaker's book many years ago and thought, well it was a little bit eccentric but after all, why not? Worth investigating. I was always hearing stories about the staggering results produced by rock flours, saw a video, read press clippings etc. Not really convincing, but as a biologist I can imagine how it might work.

However, all this anecdotal stuff is just not good enough. I have never been able to get my hands on a properly controlled study – double-blind, large numbers, proper statistics, etc. An SR enthusiast turned up here one day and offered to *make* us some rock flour from glacial erratics and mixed beach shingle. He did this, and I carried out a pot experiment with 100 plants. There were no measurable results.

Perhaps this was not the right stuff? I have tried to contact the various people in Britain listed in your journal. None have carried out controlled trials, but referred me to Eileen Moore of the "College of Soil Research". I wrote to her to find out where I could get hold of suitable rock flours, and she replied that the best material was ordinary sharp sand, which gave better results than volcanic dusts.

I find this hard to believe. Sharp sand is a very common garden material, used in potting composts and to root cuttings, etc. We use it all the time. Is this it? It is almost pure silica. Surely the whole argument about rock flours is that a) they contain a rich cocktail of micronutrients and b) the ultrafine texture is crucial to make them available to plants.

So now I'm back to square one. Because we are a national information centre on "alternative" systems, members of the public regularly ask our opinion about rock flours and SR, and we would dearly like to give them a useful answer. As it is we always have to say we don't know, except that lots of people claim extraordinary results. We would really like to do some proper trials so we could give a definite answer to enquiries, but we just can't get hold of the "official" dusts. Could you help us?

Peter Harper
Centre for Alternative Technology
Machynlleth, Wales

Editor: Research Packets are on the way. It would be wonderful to have you do some proper trials. I cannot answer the question about Eileen Moore's 'sharp sand'.

SR and Nutrition

I have been asked to prepare a report for a school in Scotland which is run for children with special needs. There has been an unfortunate increase in the level of violence between children and staff and I wish to show in my report how a mineral enriched diet could well help to alleviate this problem.

In one of the editions of *RE* there is reference to tests made with rats, feeding them with a typical western diet as opposed to a diet fed to people living in the Himalayas where the food is enriched with minerals from glacial dust. I need to get hold of scientific evidence showing how a mineral enriched diet can help children who tend towards aggressive behaviour. Can you let me know where research is currently being carried out on this subject.

The school council are extremely interested in any information that I can compile for them. Any new treatment will be immediately watched very closely by the educational authorities in Scotland.

George Ripley
Forres, Moray, Scotland

editor: Readers are welcome to send info and literature on this subject.

SR for Rural Workers in Brazil

We have been in touch with your institutions for several years, receiving your publications and texts which are of crucial importance for the planet.

At present a group of rural workers got particularly interested in rock grinding and SR processes. We are studying the subject in order to make a practical experience with rock dust in agriculture as soon as possible. Send us any info on experiences in Brazil and instructions as detailed as possible on how to build a rock grinder and whatever is practical around this topic, including the needed quantities of rock dust.

Carlos Cardoso Aveline
Adilson Milton Hack
UPAN, Sao Leopoldo, RS, Brazil

New Rock Dust Source in Australia

I have recently learned of your work in promoting SR efforts with the industry and through conferences. I have been for some time encouraging similar work here in Australia, where our ancient continent is in desperate need of some new nutrients! We have only this year established a commercially available rock dust (Basalt/Granite/Dolomite/Bentonite) of sufficient fineness to begin widespread trials. We really lack good information from overseas experiments – especially Europe.

Our biggest challenge here is distance, and many old sedimentary soils are quite a few kilometres from rock sources. Transport cost is a major barrier for most landowners. Our other big question is matching rock source to soil and farm management regimes and making sure the material is fine enough, or has the optimum mix of fine and coarse material.

Larry Geno
Lismore, NSW Australia

Worldwide Network of Betsan Coats

We have been very busy with people writing in and asking for information. Barrie Oldfield, President of The Men of the Trees in Western Australia organised talks about SR which were very well attended. Gradually knowledge of rock dust's effect is spreading.

Quite a lot of interest and queries have been coming from Argentina; people forming new planting groups chiefly.

We are working on a new paper to do with unemployed people, planting trees, using rock dust of course! Its aim will be to be worldwide, and so a huge movement, hopefully with UN support.

We send out a folder full of SR information to people who write in asking if it is possible to have it.

Betsan Coats
Alexandra Headland, Queensland, Australia

My situation is, I am currently in prison, doing correspondence courses and studies in permaculture, aquaculture, plant propogation, organic fruit and vegetable growing and self sufficiency, as well as environmental studies. I work in the market garden run by the gaol which really helps with my studies. Being in gaol, I am unable to afford to subscribe to your magazine. Would it be possible for you to send me copies as they are released and maybe a few back copies?

Paul Messenger
Cessnock, NSW, Australia

Editor: Readers might like to send literature on these subjects.

SR in the Carribean

Thank you for sending us your letter on the state of gravel dust in the Caribbean. We are farming 23 acres in a beautiful valley, growing varieties of lettuces and herbs in the first phase, while we are in the midst of building an herb cottage and creating a sustainable/profitable farming environment.

Joseph sleeps in a quilt filled with paramagnetic rock dust and attributes splendid results to doing this. We look forward to spreading Clod Buster on all 23 acres.

We wish you continued success, especially we would like to network SR, as the land mass is extremely depleted and demineralized. So much improvement is needed and most people don't make the correct connection between body, soil and food vitality.

Joseph Dinsmoor & Debra Lynn Connor
Joseph's Organic Farm & Orchard
PO Box 735 Rincon, Puerto Rico

I grew up in Barbados, West Indies, where I am developing an organic farm. It is a coral island so I'm very interested in rock dust's applications and availability. Do you know of any people or groups concerned with remineralization in the Caribbean?

David Cooper
Arcata, CA

Seeds from Poland

Greetings from far away Poland. Here I am, an American, where East meets West, and I'd like to tell you about one of the best.

What we have here is a man, Roman Plasnista, who is a breeder apart. He is a collector and cultivator of rare and vanishing species of plants, herbs and spices. For the past twenty years he has devoted himself to watching, talking, peeping and popping in on his propagations. Using only natural manure (no chemicals), ashes, fire, prayers, morphological energy radiation and good vibrations, he has created diverse species instilled with a solid, stable, and firm sense of values.

Amazing, but true, his methods are the reason why his plants give happy, healthy and lively seeds fully capable of germination, even in extremely tough, adverse climatic conditions.

His one wish is to share his seeds of wild herbs, flowers and creepers with lovers of this art in the U.S.A. Furthermore, he wants to do this for free, no charge!

It is his wish that offering one-of-a-kind seeds from Poland to your large readership will stimulate and contribute to international good fellowship between our nations, as well as help you to give a piece of the old country back to the millions of Polish Americans, many of whom must be a part of your readership from Alaska to Florida. Let us leave no stone unturned in planting these good seeds.

Ronald G. McGenty
for **Roman Plaslista**
Botanical Garden
P.O. Box 6
PL-95-200 Pabiance, Poland

SR Enhances Flavor in Sweden

Here in Sweden we have a very mineral rich soil, mostly because the icetime left us so late. We always expect top harvest of everything, and climate conditions for all we can grow here are mostly good. Here at Elgboda we have remineralised

1/4 of the area and we cannot see any difference after six years, but we find the taste is better.

I am working very hard to introduce hydrogen power here, because hydrogen is the only clean fuel we know, a fuel we can produce from all biologic waste and also via electrolysis from water with use of sun-wind-water-wave-tide power. We can also reduce our energy use by 50% if we want to use well-known and tested low energy techniques.

I am now 70 years old and I have always been interested in poison-free natural farming and gardening, 40 years in Sweden and 10 years in Australia, where our family still runs a farm. Here in Sweden our oldest son is now the farmer. I am a member of the Environment Party in Sweden, The Future In Our Hands, Forest and Trees, IAHE (International Hydrogen Organisation) and some Nature Care organisations. I am spending the most of my time as a pensioner for work to improve living conditions for all Life on our Earth, and I feel satisfaction with what I am doing and I know our time is short. I am wishing you all the best in our fight for survival on our Earth.

Bertil Eriksson
Elgboda, Sweden

FROM THE U.S.

Praise from *Mother Earth News* Founder

Nice work. Keep it up. If I were still the Main Man at *Mother (Earth News)*, I'd certainly be publicizing you! However, I haven't had anything to do the the magazine, the syndicated newspaper column, or the syndicated radio program for about 15 years now. As a matter of fact, they were all out of business for a while and only the magazine is now back...trying to be what it once was.

I sometimes think of doing a mini-*Mother* in newsletter form...but the solid decade of 18 hour days, seven days a week, left me (a polio victim at that!) very, very tired. Now I just mostly watch other folks do the heavy lifting – folks like you!

Here's another order. With a little extra for good measure. If you have a few extra copies of ***RE*** stick 'em in. I keep giving my copies away.

John Shuttleworth
Evergreen, CO

SR Research in Illinois

Agrosystems Management, Inc. is my consulting service, whereas CIARF is my not-for-profit research and teaching organization. I am anxious to include SR into the CIARF system. With our cover crops and aeration techniques we are building up the organic matter and the microbial populations. I suspect our farms and soils are ready for rock dust. Could possibly have five to six farms with replicated trials this summer, depending upon cost and availability.

We have been doing farm research since 1988 and love being on the cutting edge. We look forward to learning more about SR and teaching it to the farmers of Illinois and the Midwest.

Dr. Bill Becker
Central Illinois Research Farms, Inc., Springfield, IL

Thank you for the research packets. The use of rock fertilizers promises to comprise an important part of my education in organic agriculture. Prior to receiving the packets, the use of microorganisms to maintain soil fertility was the main route in which my research was directed. I am presently writing a paper on agricultural production in Mali and hope to work with arid soils in the future. One of the points that I will raise is that famine and low crop productivity cannot be combatted until the ecological foundation for an agricultural system is established. With poor soil fertility and a lack of vegetation there cannot be an operational nutrient and water cycle. The practice of SR as a by-product of the mining industry in Africa may do much to increase soil fertility and recreate the natural nutrient cycle that is the crux of an organic agricultural system.

Sonni Clark
N. Cleveland Ave., St. Paul, MN

RE Online?

RE is a pleasure to read and gives me that feeling that sanity exists and has a chance to prevail.

I am a subscriber to CompuServe Information Service and would appreciate being able to read articles on-line as well as in print. Have you contacted CompuServe about making ***RE*** available? Are you aware of the "Earth Forum" in CompuServe? I have downloaded several articles from there regarding ice-ages etc. Perhaps SR could be added as a "library" within the Earth Forum where contributors from around the world could share information. This could forward your standing as a leader in this field and increase communication among SR innovators and newcomers like myself. What do you think?

Paul Gurnsey Player
Dunedin, FL

Editor: This is a wonderful idea. Do I have any volunteers? I have wanted to do this, but haven't had time so far. Yet the ramifications are so important and far-reaching for SR networking – probably even more than the magazine, as it would reach a wider audience.

Update of German Gravel Source List

Thank you for your special editorial comment to my letter about inorganic and organic minerals. It made me review all I have learned. Foremost I found that John Hamaker answers the question himself in his 1989 paper *A Warming? No! Just Glaciation and Starvation:*

The microorganisms combine the gases and minerals to make the organic compounds of life within their cell walls. The plant life extracts the compounds from the microorganisms and adds the energy compounds of the photosynthesis so that all the other life forms can have the energy supply to function.

Dr. H.M. Shelton in *Superior Nutrition* writes it this way:

The direct transformation of organic matter into the living animal tissue is impossible. There must always occur the intermediate phenomenon of plant life.

As long as we have not yet sufficiently remineralized the soil, we must live with what we get from the plants. We can do it, even today, but we have to live as we have biologically *adapted over the millions of years of our evolution. We have to eat raw foods in good combination, and just enough that we do not overburden our system. Cooking alters food chemically. It destroys vitamins and converts the organic minerals back to inorganic. Our bodies can only digest and assimilate life foods in their natural, whole, fresh form. Fragmented foods are as insufficient as NPK is to the soil organisms. But it's good to know that our bodies are very efficient; they recycle minerals and other essentials before they discard used cells. The only inorganic matter we need is clean air and pure (distilled) water.*

For the record, I'd like to mention that red pumice and also slag did well on our tomatoes. I fertilized them in the fall. They not only survived the winter, they grew and flowered. The control group (on even better soil) barely stayed alive.

The sandy soils in North Central Florida are very poor. The jet stream, dipping down, often damages the weak plants. Florida is not yet more desertified because of all the water around. The need to remineralize is great.

Our compost truly amazes; after treating it with some Planters II, it was ready in the shortest time, and it is teeming with red worms. Planters II also shows good results on sweet peas, endive, lettuce and celeriac. The strawberries fruit earlier and taste better. There is hardly any insect damage.

I talked to Mr. Gene Rice of the Lithonia, GA granite quarry, Davidson Mineral Properties. Since Mr. Davis retired, the company is not interested in selling the M 10 sand to the few organic people who had used it in bags with the print *Hybro-tite* on them. The bagging facilities are gone. I suggested they should try to sell it to the chemical fertilizer industry as a filler. I know that's an awful compromise, but at this point in time everything that will remineralize the soil should be tried. The granite M 10 sand is rather heavy, and not all will fit through a mesh of 200.

Renate Hageman
Rt. 1, Box 228, Crescent City, FL 32112

I read your interesting letter in ACRES, U.S.A. When John Hamaker still lived in Missouri, he invented the gravel dust machine which was described in ACRES, U.S.A. I wrote him about my interest in gravel dust, so he wrote me a very descriptive letter about his work. I live in the northern section of St. Louis, where the Missouri River meets the Mississippi. There is a limestone quarry which also has a barge that digs up the Missouri River sand. This sand is very fine, like a dust, and I use a lot of it in my backyard garden.

Just south of St. Louis is Graniteville, where they mine this lovely red granite for tombstones. I plan to stop by there and get some granite dust for my garden. Several years ago, while down in Texas, I bought a sack of granite dust. However, it was more rock than dust. In checking on Azomite from Colorado, they charge $15.00 per bag plus $15.00 UPS shipping. Also in Colorado is the U.S. Soil Company with their ELX brand of Rock Dust Fertilizer. Since they have a distributor in the St. Louis area, last month I purchased three bags at $6.60 per bag. It is a fine powder, and the distributor told me his wife uses it for houseplants and the garden with amazing results. I used this on my grapevines, so I just can't wait for the results next spring.

Alphonse L. Tonietto
St. Louis, MO

Growing SR Kenaf for Paper

Originally I was most attracted to SR efforts on forest land to increase health/growth of trees to cleanse the environment, but have recently become interested in a particular annual crop – Kenaf.

The Spring 1994 *Earth Island Journal* was printed entirely on Kenaf paper. I would like to see the USDA supporting studies of SR trials of this amazing annual plant. Producing 8-10 tons of easily processed biomass per acre – just imagine mineral-fertilized potential production. A great way to re-employ our nation's farmers and land and to save our forests.

I am saddened to see old-growth forests in my state pulped for newsprint and telephone books. Kenaf, cereal straw, and hemp could revitalize the paper/fiber industry.

Albert Durkee
Bellingham, WA

I read a brief letter in the *Small Farm Journal* several months back regarding your efforts. We have an 82-acre farm – some upland, some bottomland, some woodland – here in southern Illinois which we are putting into production. This spring we will be fencing for a few head of grass-fed, organically raised beef cattle. We are also planting a large orchard of heart-nut walnut on 10 acres of the bottomland. We calculate about 700 trees when complete. I am contacting the Northern Nut Growers Association with regard to assistance in this phase of our permaculture.

Bees are another option which I am exploring. How many other farmers in this area can state honestly that they are running hundreds of thousands of head of livestock on their small farm?! They may have small heads, but they are livestock, are they not? Guinea fowl, ducks, and possibly ostriches are other options we are exploring.

Regardless, I am interested in your concepts regarding remineralizing the earth. My field is archaeology, and I have a very good grasp of what mankind has done to his fertile land worldwide. The question is "What are the solutions?" You certainly have one and I am interested.

Joshua Tree
Yzama Trust
Buncombe, Il

I have been certified on this 1234 acre farm for the past seven years. The 10-12 acres that are spread with gravel dust and basalt dust continue to show positive effects of the SR approach for a healthier and balanced agriculture. Although the past two growing seasons have had an adverse affect on some types of plants, others are performing exceptionally well. For instance, the trees remineralized in our yard had tremendous growth and were disease-free. In the garden, potatoes, onions, radishes and cabbage did well. Plants that need lots of sunlight and heat (tomatoes, peppers, cucumbers and squash) did not produce as well.

My visitor this year was from Canada. Mr. Tim Findlay was able to see first hand the response to SR that he already is so enthusiastically supporting with his efforts. I showed him the effects of SR on our trees, in the garden, and also on the oats in the field comparisons. He remarked about how tasty the potatoes were that he had sampled.

Along with these positive notes, there is a realism, that is "the income side of agriculture production will not warrant the cost of remineralization". When leadership is developed to understand the full spectrum of natural law, from magnetism to microbes, then we can make big strides in clean environment (soil, air, food).

Robert Love
Lime Springs, IA

Queens County Farm Museum

On November 9th, '93, an order of (20) 35 lb. bags of "Bio Plus" arrived at Queens County Farm Museum via UPS, from Rod Lertola of Meridan Environmental Group in Okemos, Michigan.

I had planned to apply half to the planting fields before the first snow, and the other half just prior to spring planting, but due to logistics in the farming procedures, I plan to apply *all* 20 bags just prior to spring planting. The reason is: On or about December 15th a manure spreader will be used to deposit a pretty large collection of manure and compost on the planting fields. It will rest there until the spring, and then the farmer will disc it into the soil with a wheeled disking mechanism attached to the back of a tractor. I assumed that after the disking process I should apply the rock powder, so this way the powder would not be trapped underneath the manure and then be lost somewhere in the soil during the disking process thereafter. I assume that I should allow all the machine working of the soil to be done first, and then the application of the rock powder to be done as a final measure, just before the young plants go in. Do you suggest I do it in any other way? Should I apply the dust onto the manure in the spring and then let the tractor disc it into the soil: Is there any down side to the way I had planned to do it originally? I am a layman and am getting a crash course on this entire subject. I will accept any and all advice.

Does the rock dust act immediately on the soil, or is there a need for some lapse time for soil digestion, before the young seedlings are transplanted into the outside planting fields? Rod Lertola states the product is #325 mesh, so I assume that is extremely fine for soil microbes to quickly use. Also, when I spoke to John Hamaker on the phone, he said he uses "Bio Plus" from Rod Lertola for ingestion purposes. Also, Rod Lertola told me he'd use the proceeds from this sale to get a spectrographic analysis from Elemental Research Inc. in Canada, and I'm anxiously awaiting a copy of that report.

H.R. Templin
New Hyde Park, NY

Editor: Add some rock dust to manure and disk in some rock dust with the manure, rather than layering on top, for proper integration into the soil with organic matter for a synergistic response.

Lightning Remineralizes

We are gearing up for the start of the new growing year. Daily temps are near 95°F. The thunderstorms provide sporadic relief, but the lightning is *so* dangerous. Ever hear that lightning mineralizes the nitrogen in the air into a plant soluble form? Mixing rock dust into the compost and spreading on the lawn. Locally available materials include rock phosphate, greensand, dolomitic limestone and seaweed. The local Fertrell rep stocks many rock powders. Shipping expenses require research into local sources.

Tom Carey
Sundew Gardens
Oviedo, FL 32765

Nutrition, SR and Mental Health

Looking over an old *Tilth* publication I came across your name in an article about SR/global cooling. This interests me very much both as an organic gardener and as a worker in the unrecognized field of orthomolecular psychiatry. The Well Mind Association is primarily a nutritionally oriented group. Demineralized food crops seem to affect vulnerable people's central nervous systems intensely. The late Dr. Pfeiffer (Princeton Bio-Center) studied the effects of trace mineral deficiency and concluded it was a basic cause of many disorders. This, of course, is still regarded as highly controversial.

Tilth is having its 20th Anniversary in Portland, Oregon – lots of rock powder support there.

Elaine V. Stannard
Seattle, WA

SR and Algae

I became interested in John Hamaker's book through a company called Cell Tech. The founder, Daryl Kollman, mentions the coming of an ice age and some of the principles mentioned in *The Survival of Civilization*. The book is changing my whole life.

I am evolving a business which will allow me to educate to help prevent the coming ice age and to remineralize the Earth. I am hoping to find info through ***RE*** about the existence of a gravel crusher, small and economical enough for me to purchase. I do not know if one even exists.

I am also interested in making known how algae relates to all of this. The Cell Tech company is a Network Marketing company which distributes algae products through individuals. I am a distributor. The contribution that algae plays in preventing the ice age is major since algae creates 90% of the O2 while taking in 90% of the CO2 around the planet. It does this 1500 times faster than all other plants. Since there is an urgency in removing the CO2 from our atmosphere as quickly as possible, I have decided to educate as many people as I can about the situation and how to handle the immediate danger with the growing of new algae ponds and to rebuild our planet by remineralizing our soil.

Janis Ihrig
Montrose, CA

Editor: A few years ago a small grinder was available for about $28,000, but it is not being manufactured at this time. Local aggregate fines and SR products are available and more practical than grinding your own.

I have a pea-patch; the city of Seattle has 30 or so going here, some on city land, some private. The P-Patch program owns a few. Living in an apartment not too far from it is wonderful.

Margaret Wylie
Seattle, WA

There is a zinc mine in Gordonsville, TN which sells agricultural lime that contains some zinc. They are the Jersey Miniere Zinc Co., tel. (615) 683-6411. Their other product is germanium. The geologist there refused to tell me how much is in it, only that it is measured in the zinc ore in ppm rather than the usual ppb. I was interested, because the list of plants that concentrate germanium is the herbal Hall of Fame – aloe, comfrey, garlic, ginseng, shitake, onions. Germanium improves cellular oxygen levels and helps with virus infections and chronic degenerative diseases. The geologist popped my balloon, however; he insists the germanium is in a form the plants will be unable to use. He said we need germanium from a mine in Montana which is in a more assimilable form.

Donna Hudson
Cookeville, TN

Setting the Record Straight

I wish to thank you for the review of *Super Nutrition Gardening* on page 19 of your Winter 1993-94 issue of ***RE.*** Though it was an excellent review, I was a little disappointed in the reviewer's remarks in the last paragraph where he stated,"...when he does (read Hamaker's book) I suspect he will do some field tests and change his recommendations for mineralization."

Some kind of misunderstanding here. I do not remember Mr. Hurrle's asking me if I had read the book, and he must have thought I said I had not. But it was so hectic at the conference it would be easy to misunderstand what was said in conversation. Yes indeed, I have read Mr. Hamaker's and Mr. Hensel's books carefully several years ago, and my book is an outgrowth of what I read there. Can Mr. Hurrle be under the impression that the advice given in my book clashes with Mr. Hamaker? I acknowledge Hensel in my book so am I against Hamaker?!

It is unfortunate the reviewer wrote that last paragraph, since I am the only writer who has figured out a practical, step-by-step method of scientifically implementing the teachings of Hensel and Hamaker, along with Dr. Albrecht. Your readers may get turned off when they read that last paragraph, and thus deprive themselves of some of the most valuable information yet developed to forward remineralization.

Remember that I have four degrees in agriculture, including a Ph.D. in horticulture and agronomy along with experience dating back to 1950. This endows me with considerable expertise and credibility. You in the SR movement are dealing with plant science and agronomy, the sciences of plant growth and soil fertility. Soil fertility includes SR. I can back up my claims with data from research. I have already done those field tests Mr. Hurrle mentions, and the table at the bottom of the review is proof of it. While with Texas A&M I was known as the specialist who was always out in the field. Where do people think I got that data in my book? Much of this data is original. You won't find it anywhere else because you cannot find trained, competent researchers who have the interest and the dedication and the time to do the field tests. I believe the remineralization movement needs this kind of input. I hope you agree.

To set the record straight, I have written an article entitled *Scientific Remineralization.*

William S. Peavy, Ph.D.
American Institute for Abundant Living
Albuquerque, NM

Questions Asked Already Answered Problems Defined Also Solved.

At variance with the USDA attitude as stated by Dr. Harold V. Breimeyer, USDA-ARS, University of Missouri, Columbia, a decade ago before 3,000 farmers and scientists in Des Moines, Iowa; representatives of the National Aggregates Association posed several unanswered questions and unsolved problems which must be resolved before launching a campaign to remineralize soils with industry "fines".

"After all, everything worthwhile in agriculture has already been discovered," Dr. Breimeyer told that audience. He insisted his statement remained correct during a 1991 telephone conversation with him in Columbia.

The accuracy of the situation is that research efforts at solving the agricultural problems caused by five years of "research" financed by the chemical trusts, as stated by Sam Catalano in Winter, 1994 issue of ***RE***, haven't even started except by organizations such as *RTE* and individual businesses.

As an example, the answer to Bob Able's question, "How will the minerals and trace elements become available (water soluble) to plant life?" is that microbial and earthworm digestion renders those elements plant-assimilable, but not necessarily water soluble. The plants take up those organized minerals by the biological process, not the chemical (water soluble) process. Thus plants continue feeding from soils so dry that moisture is barely detectable. Dr. Barglya Rateaver explained that process at the 1974 *ACRES-USA* Conference and has written extensively concerning the process.

Leaching and erosion of those organized minerals is greatly decreased, just as soils containing adequate amounts of such minerals stay in place.

Somewhere in the U.S. in each of the past 26 years, so-called drought has decimated chemically fertilized crops. Each of those years farmers who have scientifically mineralized their soils have enjoyed highly profitable crops, as *ACRES, U.S.A.* and *BIOLOGICAL FARMING NEWS* have been reporting.

Leland B. Taylor, Publisher
Biological Farming News
Albuquerque, NM

The Network

A Grapevine For Subscribers– to network and communicate with each other about SR

Robert Able
PO Box 400
Collins, NY 14034
716-532-3372
Gernatt Gravel glacial dust (see ad)

Lisa Ahn
Earth Research
Box 36
Westlake, OR 97493
(503) 997-3741
Gerson and Gaia therapy w/ SR

Alliance For Community Education
Anne Pearson
5103 N. Crain Hwy
Bowie MD 20715
410-741-0125
Green gardens programs

Lynne August
PO Box 323
Newfane, VT 05345
802-254-5051
Physician, farmer, researcher, educator pursuing SR and the body chemistry.

Craig Baker
Nyvgati Ter 4
1132 Budapest, Hungary
Organic seed farmer

Banks of Eden Farm
Mike Banks
5067 Cooper Road
Eden, MD 21822
410-749-8994
Clean compost meeting all organic specs.

Rodney Barnes
Browca Street
Hemet, CA 92544
909-796-0119
909-927-8069
Rico Verde & Clod Buster and formula of Vital Energy Formula Chinese Herbs. Lectures on gardening, Ag, health foods and minerals.

Michael Biskup
7781 North Baird
Fresno, CA 93720-0238
(209) 299-9433
Interested in relation of raw food diet/health/SR and long term effects on fruit and nut trees.

Natalie Blahut
9302 Miccosukee Rd.
Tallahassee, FL 32308
904-656-6097
Organic gardener - vegetable/flower marketing.

Joshua Blue
P.O. Box 3091
Wailuku, HI 96793
808-249-0601 (phone/fax)
Continuing SR/Maui & showing Ice Age documentary on Public Access TV. Looking for a partner health-oriented (21-40).

Bob and Kathy Butler
257 38th St. Dr. SE Apt. #5
Cedar Rapids, IA 52403
319-693-8351
Dist. – Super Blue Green Algae, Mineral Toddy, other. SR for organic acreage.

Jarrett Buys
Safeguard Earth's Environment Foundation, Inc.
P.O. Box 96
Clearwater FL 34617
(813) 442-6924

Tom Carey
Sundew Gardens
PO Box 214
Oviedo, FL 32765
Market gardens, growing vegetables, herbs, fruits. Rock dusts mixed into compost, offer workshops, wheatgrass and a radio program.

James E. Carroll, PhD
609 Holly Hill Rd.
Johnson City, TN 37604
See *The Grapevine*

J. Turner Carson, M.D.
6986 Cint/Columbus Road
Cincinnati, OH 45241
513-777-2888

Mrs. Eva B. Cate
602 Contour Avenue
South Pittsburg, TN 37380
615-837-7300
Retired guidance counselor interested in nutrition and environment.

Chesapeake Earth Foods, Inc.
5038 Ten Oaks Rd.
Clarksville, MD 21029
410-531-1389
(800) 886-0272
Using rock dusts in compost making, greenhouse and field growing. Like to hear from other composters, etc.

Walter L. Childs, Jr.
1350 Kissingen Ave.
Bartow, FL 33830
(813) 533-4849
SR is a very important part of living in harmony with the universe. I write and teach seminars on "How to own your own life".

Anneke Corbett
78 Chestnut Street
Florence, MA 01060
413-585-0804
Home flower and vegetable gardener.

Murrayel Coulton
P.O. Box 1088
Jacksonville OR 97530-1088
503-899-1774
Would like to interact w/ others using minerals in home gardens.

CO2 -ACTION
PO Box 96
Clearwater, FL 34617-0096
Fax: 813-443-4731
CO2-ACTION is a non-profit devoted to bringing understanding of the global climate situation and the reduction of atmospheric CO2. Video on new technologies.

Russ Down
PO Box 156
Cape May Court House, NJ 08210
609-465-7559
808-928-8019 (Hawaii)
I have acreage on New Jersey South Cape and on Big Island (Hawaii).

Friends of David Yarrow Fund

As reported in previous issues of the magazine, David Yarrow suffered a catastrophic accident two years ago and is on the long road to recovery. David has been an ecological activist whose contributions have been great to organic farming, the homeless, and protecting Native-American sacred lands in New York. He is a journalist/writer and has contributed significantly to ***RE*** and general networking of SR on many levels.

Eco-activist and journalist David Yarrow introduced SR to Bob Able, sales manager Gernatt Gravel, Inc. in New York and they prepared a proposal which was submitted by Bob to the National Aggregate Association called *Classifier Tailings for Soil Remineralization: Aggregate Industry Contribution to the Creation of New Topsoil.* This was the seed planted that eventually lead to the *Forum on SR and Sustainable Agriculture* that took place in May, 1994.

Dr. Gerald and Joan Olarsch of Naturopathic Laboratories, Inc, in Northport, Florida recently contributed a large supply of TraceLyte, their colloidal mineral supplement. David is reporting tremendous results with the Tracelyte and has written an article about it. (See book review of *Electrolytes: The Spark of Life* this issue.)

David still needs assistance from friends and will for awhile to get back on his feet. Please send a self addressed envelope to receive a list of Turtle Eyeland Publications, all works available by David.

Please send checks ($5.00/mo. or more would be greatly appreciated) made out to David Yarrow, c/o Broekx, P.O. Box 6034, Albany, NY 12206, tel. 518-426-0563 or contact RE for current address, should it change. Any checks sent to ***RE*** will be forwarded to David.

Thor Freidenwarror
52546 W. Esch Tr.
Maricupa, AZ 85239
Needing advice from gardeners working in this area. My date palms & citrus are loaded with delicious fruit, but most flowers and vegetables refuse to grow.

Friends of Trees
PO Box 40851
Portland, OR 97240
503-775-1829
We are a non-profit urban forestry organization promoting the planting, care and protection of trees in the Portland, Oregon metropolitan area. Interested in ideas on how to do SR in urban areas.

Gardens/Mini-Farms News
P.O. Box 1901
Lubbock TX 79408-1901
Tel/Fax 806-744-8517
Airmail outside U.S. on sustainable ag $10/yr U.S., $18.00/yr outside U.S.

Larry Geno
Agroecology Associates
P.O. Box 149
Lismore, NSW 2480, Australia
066-88-6274
Consultant for organic and sustainable ag, organic product certification, on farm advice and conversion plans, organic food processing and marketing.

Bro. Alois Goldberger
Regional House Ubbog
Bangued, Abra, 2800, Phillipines
I am working in agroforestry with tribal communities in mountainous areas of Northern Phillipines. Alternatives to crushing rock with machines?

Audrey R. Hadden
Rte 2, Box 234A
Hart, MI 49420
616-873-3957 - after 7 pm.
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Sidney W. Jungreis
35 Park Avenue
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Tom Jurvic
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Redway, CA 95560
707-923-2375
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Dixie Kapchinske
PO Box 93
Chimney Rock, CO 81127
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Univ. of Hawaii at Hilo
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Hilo, HI 96720-4091
Tel 808-933-3393
Fax 808-933-3674
Ass't. Professor of Soil Science & Agroecology Program Coordinator.

Moria Merriweather
2600 Senter Rd #143
San Jose, CA 95111
408-275-6544
Brand new to SR and wildly enthusiastic. Starting w/ Spiral Stonemeal (available at Common Ground in Palo Alto) I also am a new wormy composter.

Daniel Murphy
PO Box 311
Barnegat, NJ 08005
(609) 698-7170
I have a Rock & Mineral shop-interested in the environment.

James C. Muta-Zindwa
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Tokyo 165 Japan
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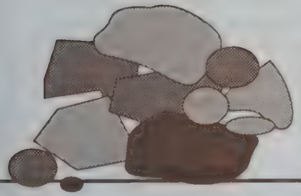

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Scientific Remineralization

continued from page 60

potassium, nitrogen, calcium, sulfur, phosphorus and magnesium. These six elements account for 99.6 percent of minerals removed from the soil at harvest time. This leaves only about 2.3 pounds per acre of trace element nutrients to fill out the plants' diet, and two of these pounds comes from only three trace elements: iron, manganese and zinc. The other 0.3 pounds comes from boron and copper. The remaining six essential trace elements make up only a tiny fraction of the plants' diet, perhaps only 1/50 pound per acre.

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The foliar spray method of supplying trace elements to leaves or the soil does not rule out applying rock dust to the soil. In fact, this is an excellent idea which we have not researched and plan to do, provided we can find a finely-ground product (200 mesh) rich in the five key trace elements backed up by laboratory analysis.

Super Nutrition Gardening *is available by writing a check for $14.95 plus $3.00 S&H ($17.95 total) to Dr. William. Peavy, at 316 Horton Lane, NW, Albuquerque, NM 87114*

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SR ResearchPackets 1995

Soil Remineralization Agriculture Packet

SR research around the world for agriculture and orchards. Spiral bound, 146 pp. See Price List on order form on subscription page.

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Spiral bound, 82 pages.

Video

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A four-tape set of the Forum on Soil Remineralization and Sustainable Agriculture, which took place May, 1995 at the USDA headquarters in Beltsville, Maryland is available for $65.00 from ***Remineralize the Earth.***

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The Survival of Civilization

by John Hamaker and Don Weaver ($12.00 ppd.). This important book is the foundation on which SR and the grass roots movement rests.

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Don Weaver, Hamaker-Weaver Publishers, P.O. Box 1961, Burlingame, CA 94010. Tel (415) 347-9693. -*The Survival of Civilization* ($12.00 ppd.) can also be ordered from Anita Hamaker, Hamaker-Weaver Publishers, Rte. 1 Box 1490, Seymour, MO 65746. (417) 935-2116.

Video

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The video is also available from *The Video Project, Films and Videos for a Safe and Sustainable World, Catalog 1993,* in an edited 45-minute version for $29.95. Call 1-800-4-Planet.

Earth Regeneration Society

An active and effectively organized network, stimulating and coordinating initiatives in scientific research and both governmental and non-govern-mental policy. They have available numerous scientific papers on climate for implementation of an Earth Regeneration Program. Alden Bryant, President with Fred Wood Sr., Ph.D. and others. Earth Regeneration Society, 1442A Walnut St. #57, Berkeley, CA 94709. (510) 525-4877 or Fax (510) 559-8410.

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The book by Dr. Julius Hensel and his pioneer writings from the 1890s on stone flour for agriculture, is now available from the ***Acres U.S.A.*** mail order bookstore. In addition to the classic text, *Acres U.S.A.,* has included comments by John Hamaker, among others. Softcover, 102 pages. Order No. 4024. Send $11 in U.S. and $12.00 outside U.S. postpaid). *Acres USA,* P.O. Box 9547, Kansas City, MO 64133.

Secrets of the Soil

This book by Peter Tompkins and Christopher Bird is a sequel to the now classic ***Secret Life of Plants.*** There are four chapters on remineralization. A fascinating account of recent breakthroughs – scientific and spiritual – that can save your garden or farm. This book is available, or can be ordered at your local bookstore. It is published by Harper and Row.

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